The Builder.

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The Ruined Cities of Mashonaland.

THE more archæological research is extended, the more matter seems to present itself for illustration and speculation. Even in the comparatively beaten tracks of Egyptian and Greek architecture we are now discovering that there is much left still to be discovered, and that our possible knowledge is by no means as yet complete; and outside of this region of architecture properly so called the world is from time to time being surprised by the discovery of the remains of ruder monuments of building—remains which have been unnoticed for hundreds if not thousands of years, overgrown by and nearly concealed in vegetation, which have been passed over by incurious uncivilised inhabitants of the district without notice, as if they were mere incidents of nature, or only turned to account occasionally as places from which squared stones can conveniently be obtained when wanted, but which are now attracting the attention of cultivated explorers, to whom they afford a new field for observation and conjecture. We are learning to recognise, apart from the architecture in which column and architrave are the important features, the existence in different parts of the world of remains of buildings which, while uncouth in plan and nearly devoid of architectural expression, were in their day great works of engineering, carried out with immense labour and some degree of skill, at all events the practical skill of making solid monumental masonry, and which give striking evidence of times when the main object in building was to provide a stronghold against attack; when those who had the leisure to carry out works which must have occupied a long time in execution, and during the execution of which they must have been comparatively unmolested, nevertheless used every means to provide against attacks from which they never could feel safe, and to render access to the stronghold as impregnable against defence from within as their primitive ingenuity could render it. Remains of this class have a mysterious and almost provoking interest in the fact that it is in most cases almost impossible to date them with any approach to certainty. They present no architectural features by which their historic relation to other and tolerably well-dated styles can be assumed with probability, but on the other hand they often present remarkable and unexpected resemblances to remains of almost equally uncouth character in far-distant regions.

This latter consideration is suggested by the comparison of the plan of the great Zimbabwe in Mashonaland, given in Mr. Bent's book,* with that of the Núragh in Sardinia given by MM. Perrot and Chipiez, and reproduced in the *Builder* of July 19, 1890 (page 41). This latter no doubt has a more business-like look of fortification about it, with its round towers interposed at intervals along the walls, but it is impossible not to recognise a family resemblance between the two plans in their irregular oval shape, in the long narrow passages and the jumble of plan-lines in the interior, and in the presence within the walls, in both cases, of a circular conical turret. The important difference is that in the Zimbabwe plan the conical turret is solid and is placed at the side of the enclosure, while in the Sardinian plan it is a habitable tower of defence and is near the centre and forms the culmination of plan. In the African example the conical tower or turret, of which (by the permission of the publishers) a view is given (fig. 1), is probably of a ritualistic or symbolical signification, and it differs in method of construction in one sense, for Mr. Bent informs us that the slope is formed by setting back each course from the one below it (the reverse of corbelling), so as to leave the face in a series of small steps, while according to Messrs. Perrot and Chipiez (who however are not always very accurate observers) the walls of the Sardinian tower are built in a regularly formed batter. The difference between the two, in this and other respects, would lead us to the conclusion that the Sardinian example was of much later date, and that the presence of the conical tower there is the survival of the original symbolical form, retained either with or without any reference to its original symbolism, and developed into a tower of defence. The differences between the two plans, the obvious progress towards a more rational and regular plan in the Sardinian structure, point to the same conclusion. Every approach towards regularity in setting out a plan is an index of a higher civilisation. Thus the remains of the Mexican cities and temples, laid out mostly on a rectangular scheme, indicate a much higher civilisation than the Sardinian plan, while the latter again is in advance of the Zimbabwe plan. The date of the Mexican remains is of course to be considered quite separately; but the geographical relation between Sardinia and Africa is closer, and we may imagine that in these Mashonaland ruins we have the remains of a very ancient semi-barbarous people, one of many kindred tribes migrating slowly about the vast continent of Africa for many centuries, and that in the Sardinian remains we have one of the examples of what this primitive style of building was by slow degrees transformed into among some of the tribes which belonged or had migrated to the northern regions of the African continent, and thence to Sardinia. We are not of course suggesting any direct connexion between regions so far apart as Sardinia and Mashonaland, but only that the ruins in the latter place are probably but a local example of a type of work which might have spread over a great portion of Africa, and of which many other remains may be found if looked for.

As to the possibility of a great age, an entirely pre-historic age, being assigned to these structures, Mr. Swan, who contributes the chapter on the orientation and measurement of the ruins, observes that though these walls would not remain long (comparatively) in this country, they might endure for an indefinite time in a clear atmosphere free from dust, and with annual tropical rains to wash away any accumulations of soil on the walls which might support vegetation that would destroy them.

"The few small plants which grow even on the oldest walls are of species which do not require much mineral matter for their growth, and whose roots are so soft that they mould themselves to the shape of the interstices of the walls, but do not press asunder the stones. Besides, the present

* The Ruined Cities of Mashonaland, being a Record of Excavation and Exploration in 1891. By J. Theodore Bent, F.S.A., F.R.G.S. With a Chapter on the Orientation and Mensuration of the Temples, by R. M. W. Swan. London: Longmans, Green, & Co. 1892.

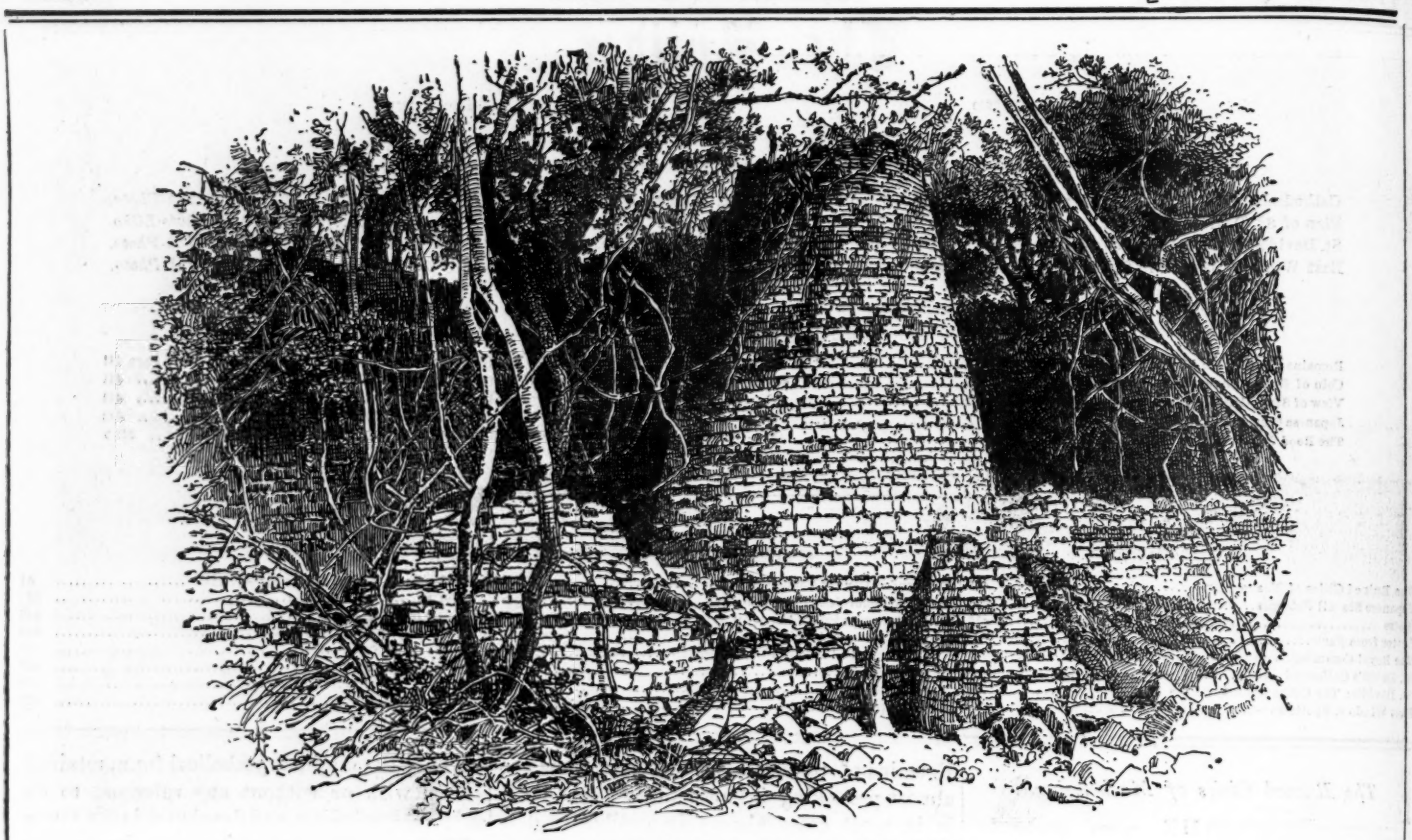


Fig. 1.—*Remains of the Conical Turret at Zimbabwe.*

inhabitants of the country do not use stone in any of their constructions, and never trouble themselves to remove stones from any existing walls, so that more stones have probably been disturbed during the two years of British occupation of the country than the Kaffirs would disturb in as many centuries."

Mr. Swan is of opinion that such a style of building as this could not have originated in South Africa, as such a development would have required a long time and a long and peaceful settlement in the country, and that it is clear from the nature of the fortifications that the builders never considered the country their own. We do not know that there is much in this latter argument. In uncivilised times men are all at war with and afraid of each other; those who are weak in defence are naturally pillaged; and the same argument might apply to French early Mediæval castles, to prove that they were the work of an imported race. That the style of building may have connexions with Abyssinia and Arabia, as Mr. Swan suggests, is possible enough; in fact, it is with architectural remains as it has been said to be with quotations or proverbs; when you have traced a saying back to Homer there is still the question from whom Homer took it; and in like manner with architectural remains, when you have connected a particular form of building with a particular site, there is always the question what earlier site and people it was derived from. We may regard these remains in Mashonaland as only one leaf in a little-explored chapter of archæology, and there is probably a good deal more to be found in quarters where more civilised nations have not penetrated to destroy the ruins and use up the stones in their own work, which is their usual fate in such a case.

Among the remarkable points in these ruins is the use of granite in small blocks, which Mr. Bent suggests is an indication that the walls were built by a people formerly accustomed to build in bricks, and using the stone in similar proportions and manner. The walls on either side of the narrow passage round the outside of the plan on the east side are nearly 30 ft. in height, "and built with such evenness of courses and symmetry that as a specimen of the dry builder's art it is without a parallel." The narrow passage itself is a very peculiar feature of the structure; it leads round the eastern margin of the site direct to the space in which the conical tower is situated, and might have been intended as a kind of access to the sacred place (if we take that view of the tower), only that the latter appears to be accessible by other openings. Is it not possible that the walls were simply a double line of defence, and the passage a safe means of communication between the exterior gateway and the courtyard in which the tower stood? Through the thick outer wall, at one point in this passage, is a hole 8 in. square driven straight through the masonry at a height of about 4 ft. above the base. Mr. Swan, who writes the chapter on the supposed orientation of the building, is perplexed to account for this channel through the wall, and can suggest no meaning for it. Was it not possibly simply a means of inspection directed to command some likely spot for the approach of an attacking party? There seems a little too much disposition to make mysteries of things in ancient remains which may be susceptible of a very commonplace practical interpretation.

About the conical tower, however, we admit, there is a mystery—unless indeed it was a watch-tower; but that would not account for its peculiar shape, and the coin of Byblos (fig. 2), showing a conical erection of such form as the Zimbabwe one would take if complete, is certainly significant, and seems to suggest a common origin for the two.

Fig. 2.—*Coin of Byblos, showing Conical Erection.*

There is a small similar cone close to the large one, and it is certainly significant, and seems as if it could hardly be accidental, that the diameter of the large tower at its base is exactly equal to the circumference of the small one. As Mr. Swan says, "when the minds of men were first interested in geometry it would at once seem to them that there must be some constant ratio between the circumference of a circle and its diameter, and they would easily discover what this ratio was, and they may have considered this discovery so important and significant that they desired to express it in their architecture." But in regard to other suggestions in Mr. Swan's chapter, we cannot help thinking that he is making out too much. We should find it difficult to believe that the people who planned a building on such irregular lines as these straggling congeries of walls present on plan, would at the same time have been so particular as he suggests in regard about alignment of different points in relation to orientation. Such refinements are likely enough to be found in ancient buildings that are planned on geometrical lines; but if the builders of Zimbabwe had geometry enough to set out certain points in their walls in relation to the position of the heavenly bodies, it might be supposed that they would have geometrical instinct enough to set their lines out straight, or in regular instead of irregular and broken curves. The altar is shown as on the axis of the line of true north in reference to the narrow entrance on the north side of the plan; but we do not gather that the actual "altar" was found, only its supposed position indicated by the finding of phalli and other relics, and we cannot help feeling a little sceptical even about this true north line of altar and entrance, which do not seem to have any other constructive relation with each other. The authors see a special symbolism, also, in the existence of an exterior wall-pattern at Zimbabwe (shown in the general view of this part of the ruins in fig. 3*), which is only continued round a portion of the wall, and which nearly coincides, but is not we think made out to pre-

* The ornament of which a larger drawing is given in the book shows a backing of very small stones behind the cross-pieces, which is not discernible in the view.

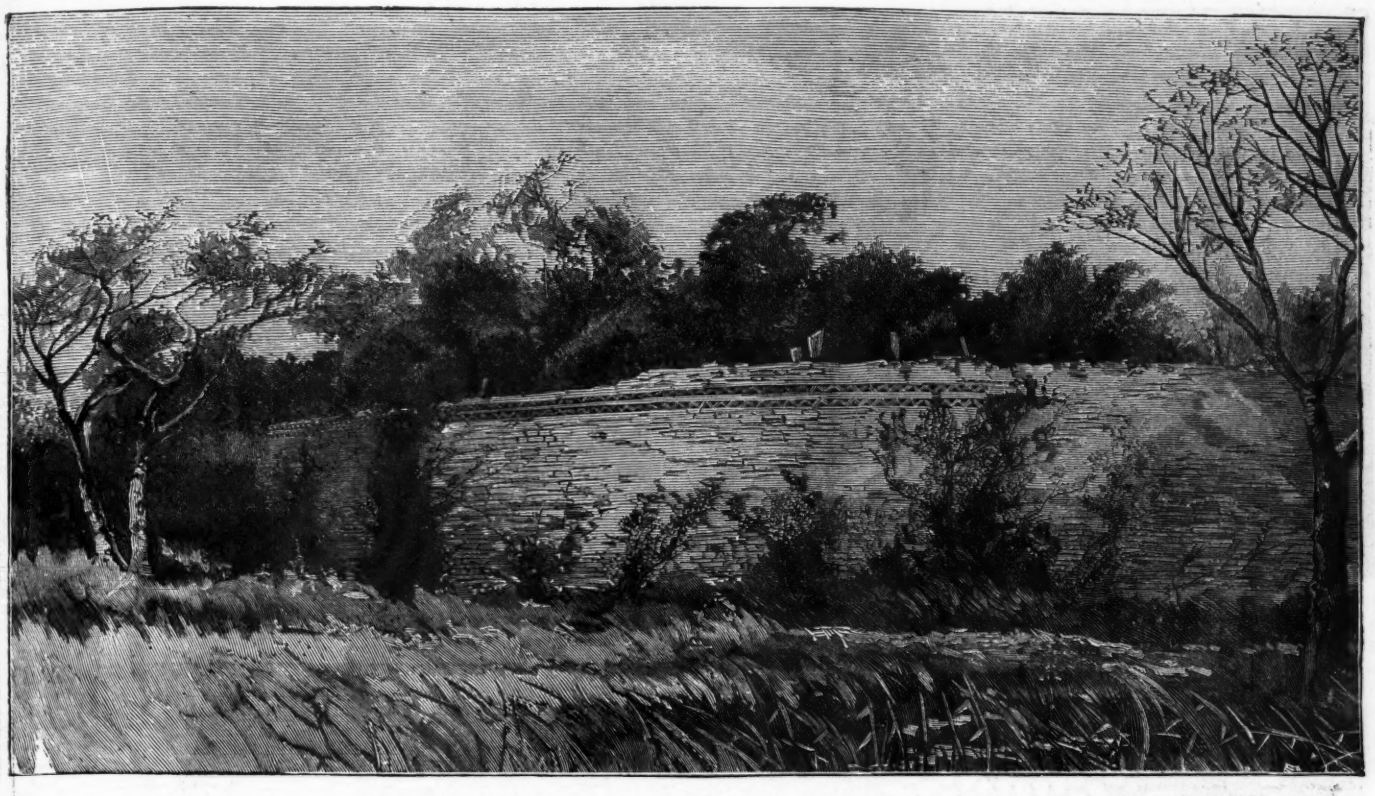


Fig. 3.—*View of South-Eastern Portion of Outer Wall at Zimbabwe, showing the Ornamental Courses.*

cisely coincide, with the portion of the exterior wall on which the sun can shine at one or other season of the year. This kind of pattern, we are told, occurs in other remains in the country, and is always found in the south-eastern portion of the walls; although we observe that in the plan of the ruins at Matindele, printed immediately over that of Zimbabwe, the part of the wall marked as decorated with a pattern faces almost directly west, so that here is a contradiction at the outset. No doubt, whatever way we take it, the existence of this simple form of decoration in buildings of this kind, and the fact that it is only carried round a portion of the walls and apparently deliberately stopped at certain points, is an interesting one to note; but the comparison with the apparently much more haphazard placing of this kind of ornament at Matindele leads us to doubt very much whether it has the symbolical significance attributed to it. The tower probably is symbolical, and has a phallic origin, and phallic emblems were found in plenty about the ruins.

Among the small objects, not very numerous, in the shape of utensils or decorative articles, which were found at Zimbabwe and elsewhere, the most important and interesting are the conventional carvings of a bird representing probably a vulture, executed in soapstone, and of which several were found, which had apparently decorated the wall of a semi-circular temple on a hill near the great Zimbabwe ruin. The largest-sized birds are over five feet high, and considering the kind of place in connexion with which they were found, they have more artistic merit and power than might have been expected. These monumental-looking birds sit on the top of soapstone pillars, and though very broadly treated, with little of realistic effect, they give the character of the bird well; the legs only, and their joining on to the body, appearing to have been difficult to the carver. The few fragments of pottery found show those forms of simple ridge-and-furrow pattern which are to be met with in ancient and prehistoric pottery all the world over. Some of the iron tools are of interest; and there is a really curious object in the shape of a thick cheese-like disc, studded at the sides with projections regularly spaced, somewhat resembling in other respects the pill symbol so well known in the arms of the Medici, which is compared with an illustration of a very similar though smaller object from Paphos, now in the Fitzwilliam Museum, studded with projecting studs executed in relief on the marble. All that the author can suggest in regard to the meaning or use of either object is that "they remind one of Herodian's description of the sacred cone in the great Phœnician Temple of the Sun at Emesa in Syria, which was adorned with certain knobs or protuberances, a pattern supposed by him to represent the sun, and common in phallic decorations." We feel some doubt however about the identical nature of the two objects, for the reason that the one from Zimbabwe (according to the illustration) is a cylinder, and that from Paphos is a frustum of a cone; an important difference, whether we regard them as symbols or as things for any practical use. Another very curious find is a soapstone mould for casting ingots of tin. A comparison of this mould with an ingot of tin found in Falmouth harbour can hardly leave much doubt as to the object of the mould, which suggests how very wide was the extent of this traffic in the ancient world, and how remarkable was the prevalence of a common habit in the treatment of the metal for the market. It is difficult to understand any practical reason for this particular shape for casting tin (a parallelogram with long notches cut out of the two ends), the only practical effect of which would be to make the same weight of metal take up more space in packing than if the notching were omitted. We may conclude however that there must have been some reason, either commercial or practical, for the wide adoption of this form of ingot.

There is a good deal of interesting writing in the way of notes and observations on the people of the country, and the book, though a merely popular one, is thoroughly readable, and will assist in drawing public attention to a province of archæology in which there is probably a good deal more yet to be explored.

A LARGE DRESSED STONE.—The stoop-stone laid in front of the Huntington Mansion, Fifth Avenue and Fifty-seventh-street, New York, is the largest dressed stone ever carried by rail in the United States, and probably anywhere. It weighs 24 tons, and measures 22 ft. by 15 ft., its thickness being 8 in. It has been dressed at Messrs. J. J. & F. P. Treanor's stone works, Hastings-on-the-Hudson, and was brought to New York on Treanor's patent stone car. The next largest stoop-stone in New York is in front of the Vanderbilt Mansion; it weighs 18 tons.

JAPANESE STENCIL PATTERNS.

IN this country we are accustomed to consider stencilled patterns as an inferior and mechanical method of producing ornament, only to be countenanced from motives of sheer economy and as a bad substitute for free-hand design. The beautiful collection of Japanese stencilled patterns which Mr. Tuer has put forth * is calculated to make one regard this art from a new point of view. In the deft hands of the Japanese it appears that stencil may be made to lose much of its mechanical appearance, and that it can be made the medium of producing diaper patterns in which the stiffness and formality supposed to be inherent in stencil work are so happily masked that we can almost forget the manner in which the work is produced.

Independently of the faculty of the Japanese for the production of free and informal-looking repetition designs, there can be no doubt that some of the freedom and delicacy of the designs illustrated in this book is due to the material in which the stencil-plate is made. We are accustomed to use stencil-plates of thin metal or thick card or pasteboard, in which it is difficult to cut a fine line. The Japanese use a tolerably thin brown paper, in which the pattern is cut out double, the two pieces being then pasted together, with when necessary a series of threads pasted in between them and crossing the openings, so as to assist in holding the whole together, while not interfering perceptibly with the design. Such is the account given by Mr. Tuer, who says in his title-page that he "knows nothing about it," but appears to have taken a little trouble to investigate the process. These auxiliary threads are not present or necessary in all designs, they are employed when the character of the design is such as to lead to a number of rather long slits in the pattern without sufficient cross support. In general however, the Japanese designers are exceedingly ingenious in devising their stencil patterns so as to preserve a sufficient amount of lateral support to the solid portions with-

* The Book of Delightful and Strange Designs, being one hundred facsimile illustrations of the art of the Japanese stencil-cutter to which the gentle reader is introduced by one Andrew Tuer, F.S.A., who knows nothing at all about it. London: The Leadenhall Press, and Simpkin, Marshall, & Co. London, Paris, and Yokohama: Liberty & Co. New York: Charles Scribner's Sons. Paris: Baudry et Cie. Leipzig: Brockhaus.

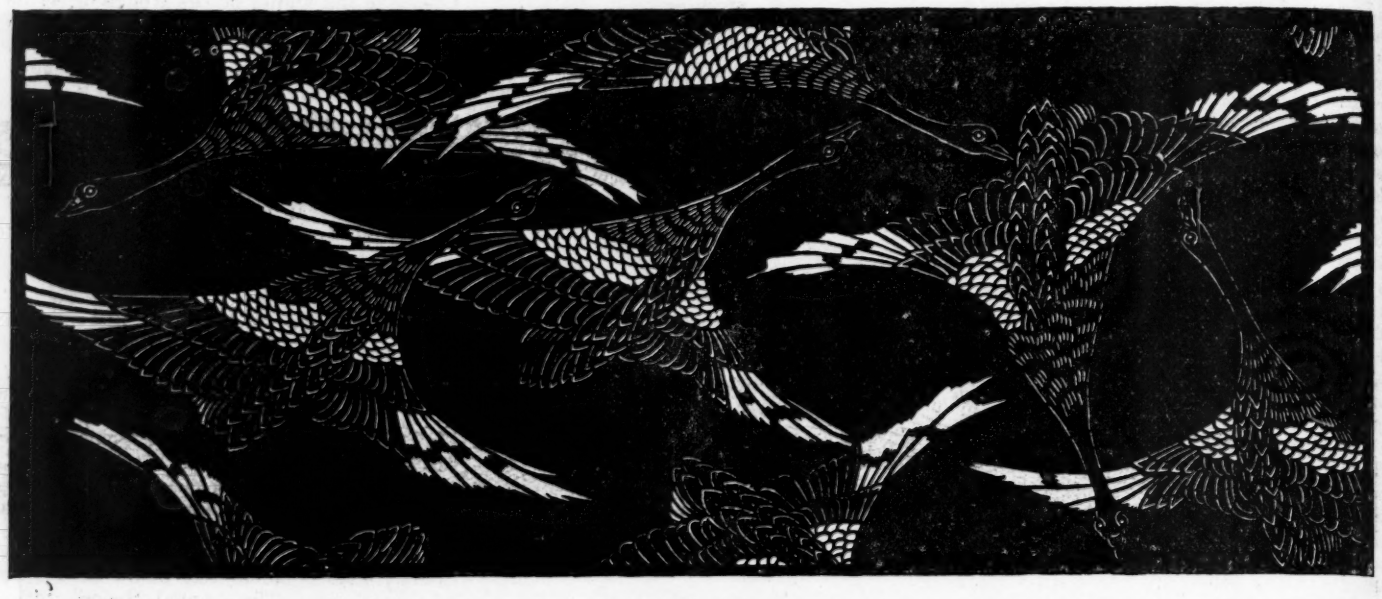


Fig. 1.

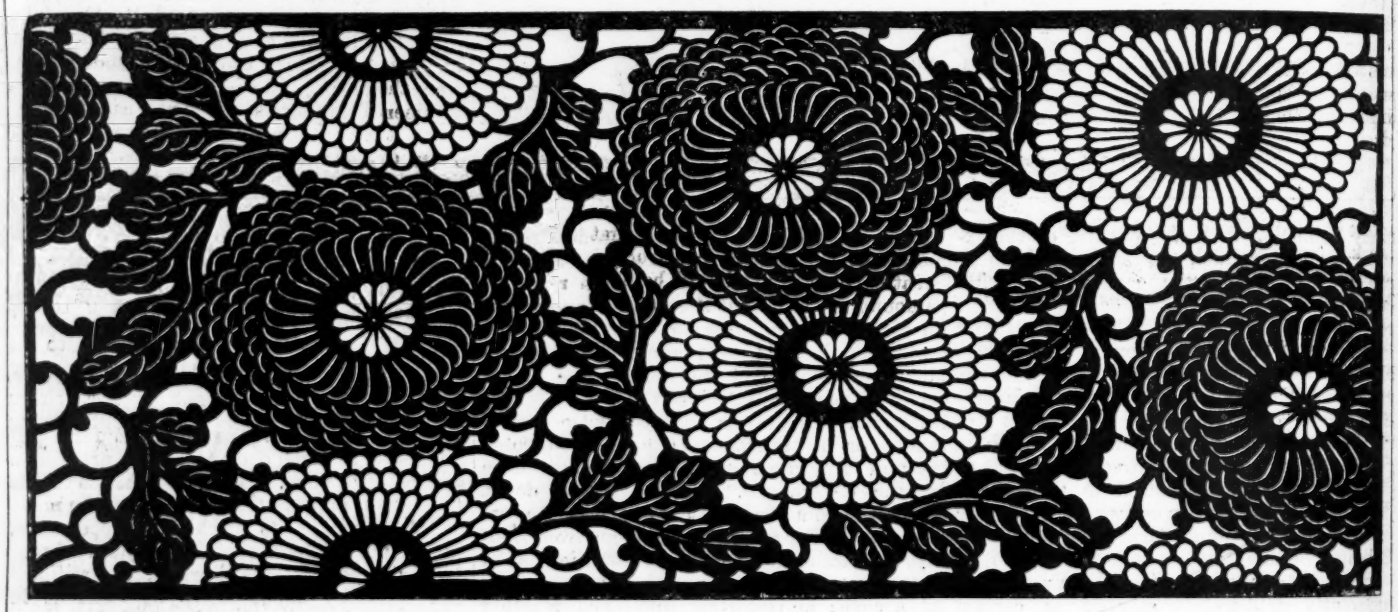


Fig. 2.

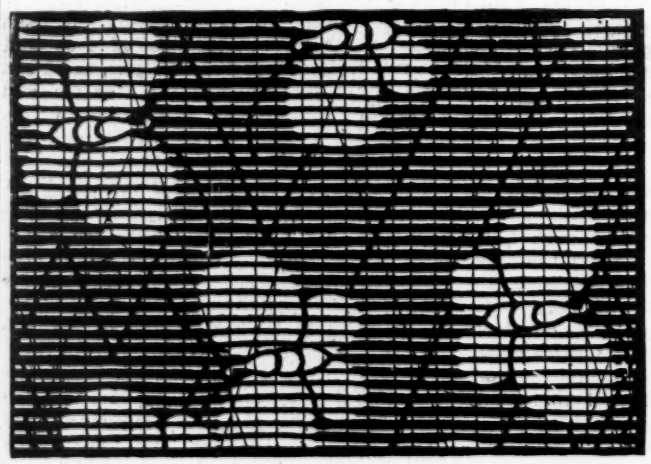


Fig. 3.

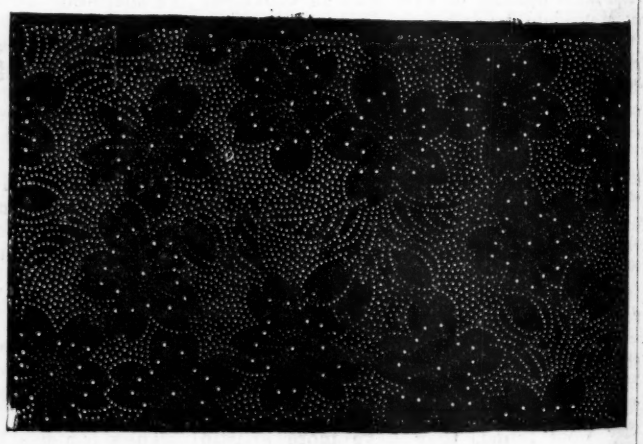


Fig. 4.

Japanese Stencil Patterns.

out interrupting the apparent freedom of the design. The stencil pattern being cut out of the thin paper with a small sharp knife, used more like a graver than a knife in the ordinary sense, allows of a freedom of line and delicacy of detail which are impossible in cutting from a more tough and stubborn material. On the other hand it cannot be denied that the use of this more fragile material militates against the life of the stencil-plate, which is much more quickly worn out than one of more robust material. But this, perhaps, can hardly be said to be a disadvantage from an artistic point of view; it tends to prevent the repetition of a design *ad nauseam*, and affords scope and temptation for the continual production of new patterns. In Mr. Tuer's publication one of the original stencil-plates is bound in as a kind of frontispiece to each volume, so that the possessor can have by him not only the results, but an example of the means by which they are produced. A different stencil-plate is inserted in each copy, so that each has a certain individual character so far as this addition is concerned.

We have to thank Mr. Tuer for permission to reproduce on a reduced scale four out of the 104 designs contained in his book, and may draw attention to some of the characteristics displayed in them. Fig. 1 (No. 4 in the book), reproduced to half the original size, is an example of a class of ornamental work to which the Japanese are very partial in painted designs, consisting of birds at different angles, the lines crossing each other and filling up

the ground of the ornament. This is a repeating pattern in one direction only (vertically), being apparently intended for an upright panel of the width of the design; but the idea of mechanical repetition would certainly not force itself on the eye in execution, if the repeats were carefully laid down. In this and all the others the dark portion of the design represents the solids of the stencil-plate, and the whites the openings. In the long white wing-feathers of the birds, it will be seen how cleverly the artist has managed to provide cross-ties by giving a black banding to the white feathers, which seems to come in quite naturally and helps the effect of the design, while it provides the necessary stiffening for slits which would otherwise be too long to stand the working without wrinkling up. In fig. 2 (No. 7 in the book), a most effective piece of conventional floral diaper, the mechanical conditions of the process are again made to lend themselves to the spirit of the design; in the white flowers the lines, which form the bars, are necessarily continuous, in the dark ones the lines, which are cuts in the paper, are necessarily discontinuous, and appear as if sketched in lightly, thus giving to the two classes of flowers a contrast of style and texture which arises naturally out of the conditions of the process. Figs. 3 and 4 (Nos. 53 and 79 in the book), are smaller stencils, reproduced here a little more than half size. Fig. 3 is charmingly ingenious, the figures of the moths being produced, as will be seen, simply by a thinning of the parallel bars of the stencil, so that the forms of the insects come out in a half-shadowy manner, quite different from the effect of hard outline generally seen in stencil work. Nothing could be more characteristic of the delicate instinct of the Japanese in this kind of work than this incident. This is one of the stencil-plates into which cross threads are worked, the nature of the pattern requiring this support. Fig. 4 is an example, one of several in the book, of the decorative effect which can be produced by a mere arrangement of pin-holes; not "pin-holes" literally; the Japanese is much too neat a workman for that; pin-holes would leave a raised burr which would spoil the working of the stencil; all the little holes are punched out.

These examples will be sufficient to indicate that there is a degree of decorative poetry to be got out of stencil work such as we very seldom achieve or even aim at in England. Not that we consider all the designs in the book as admirable as these which we have selected. Some of them are too grotesque in effect, and too angular and abrupt in line; some of them are mere imitations of basket-work and hurdles and such things, which (Japanese or European) are in false taste, though they are all treated with a vigour of execution which gives them a certain interest. There are a good many others however, quite equal in artistic feeling and originality to those we have reproduced, and their variety of *motif* is most remarkable. One shows delicate meandering sprays of flowers, as if drawn with a pencil; in others scattered conventional leaves or flowers seem to emerge from a groundwork of netted or waved lines; in another a series of Japanese parasols are combined into an effective diaper; another consists of a number of little dot-and-dash sketches of figures of men in all kinds of attitudes, indicated only in a highly conventionalised manner, making a spotty pattern the real constituents of which are only recognised on a close inspection. This is one of the curiosities of the book, rather than one of its beauties; but the beauties are predominant, and it is a book which every ornamentist may be glad to possess.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION.—A special general meeting of this Institution was held on Tuesday evening last, for the purpose of electing a pensioner on the Relief Fund. The President, Mr. Colin G. Patrick, gave some particulars of the case, after which the applicant, Mrs. Sarah M. Enright, was duly elected by show of hands, being the only candidate. Mrs. Enright is the thirty-fifth pensioner elected since the foundation of the Institution.

NOTES.

IT is announced that Mr. Tate has accepted the offer of a site for his gallery of British art on part of the site of the Milbank prison, which is to be forthwith cleared. This clearance will give unquestionably a very fine site for important buildings, though we should consider it, practically, more out of the way than Kensington for a gallery of this kind. In other respects, no doubt, the site is a fine one, so much so that we regret that there does not seem a chance of its architectural occupation being commenced by a finer piece of architecture than the new gallery is likely to be, Mr. Tate being apparently much more easy to please with an architectural design than with a site for the building. The projected design, which we published some time since, represents no doubt what the majority will deem a satisfactory and respectable-looking piece of architecture for the purpose, but we cannot pretend to think that it is all that could be wished for in such a case. A building for such a purpose as a gallery of British art ought in itself to be an example of the best architectural art of the day, by one of the first architects of the day, as would undoubtedly be the case in Paris if a similar project were to be carried out.

THERE is so much to condemn in the management of their business by the London County Council, that it is satisfactory to find that they can, from time to time, remain in safer courses. Last week the Bridges Committee proposed that the tender of Green & Co. for the construction of a ferry-boat at Woolwich should be accepted. The amount of the tender was 17,325*l.* The tender of Simons & Co. (of the Clyde) was only 15,800*l.*, and there was nothing to be said against the firm. But Green & Co. had their works on the Thames, and the Committee recommended that the higher tender should be accepted because it would give employment to London workmen. The general body of the Council, by a considerable majority, had the good sense to negative this proposal, which was altogether opposed to sound business principles. It is doubtful even whether the object of the Committee would have been attained, since it is more than probable that workmen from the north would have been obtained to put on this job. If the proposal of the Committee had been carried it would have been neither more nor less than a gift of the taxpayers' money to certain workmen. It is to be hoped that the Council are beginning to see the error of their ways.

THE London Chamber of Arbitration was formally opened last week by the Lord Mayor, when full details of the history of the movement, and of the constitution and objects of the Chamber, were given by the chairman of the Committee of Management, Mr. H. Clarke. In referring to the work of the Chamber a week or two ago, we alluded to the wide scope of its operations, and it appears that the list of arbitrators already agreed upon numbers 450, while ultimately there will be no fewer than 1,000 on the list, none of whom will be registered until the Council have been fully satisfied as to their qualifications. As the submission of questions to the arbitration of the Chamber is a purely voluntary matter, neither party will be allowed to retract without the consent of the other, and the award will thus be, to a very great extent, binding. The President of the Board of Trade, in the course of his speech at the inaugural proceedings, emphasised the fact that when one party to a dispute shows an unwillingness to submit his case to arbitration, he places himself in a bad position in the eyes of the public. Now, with such a choice as is afforded by the new Chamber, the reluctant disputant cannot so easily excuse himself by pleading lack of confidence in the ability of the arbitrator, as he might have done had the arrangements made been on a more limited scale. Mr. Mundella could fairly claim credit to himself in regard to the "conciliation" clauses of the Railway and Canal Traffic Act, which have proved so useful in the settlement of railway disputes. True, the President of the Board of Trade is not the actual author of the Act passed in 1888, but he may be termed the "father" of these clauses, inasmuch as they were first proposed in his Railway Bill of 1886. Mr. Mundella observed, on introducing them to the House of Commons, that "these clauses are entirely new, and may excite a little harmless ridicule, but I am prepared to take the responsibility," and, as a matter of fact, the discussion of the novel mode of procedure did excite some laughter at the time. The Bill of 1886 fell through, and the "conciliation" clauses were quietly dropped out of the succeeding measure, but only o reappear and be finally adopted a year tater. The new Chamber will lack one feature which characterises the arbitration on railway matters before the Board of Trade, viz., publicity. The Annual Report under the Railway and Canal Traffic Act is a decided element of usefulness in connexion with those proceedings; indeed, Mr. Mundella could hardly have been in a position to point to the success which has so far attended them, were the nature and results of the conferences between disputants kept secret—as we understand they will be in the case of the new chamber. Time will show whether anything corresponding to the Report alluded to will be found practicable.

THE daily press has lately told the story of various extensive fires in London, and, as usual, the refrain to the reports is to the effect that the premises attacked were practically gutted. The old story recurs of many fire-engines being brought together, gallantry being shown, and at last either of the fire burning itself out, being cut off, or even swamped. The Metropolitan Fire Brigade may or may not be well organised, efficient, and systematic in its work, but surely the fire-protection of London should not depend only on the quality of its mere fire-extinguishing resources. Our Building Act, of course, pays attention to the question, but many of its sections treating of fire-risks could be improved upon; and further, although fire-offices do some fire-surveying in their own interest, it is high time that we had some legislation by which at least the warehouse class of structures came under regular official control. The public receives no official instruction as to self-help in cases of fire, and even the facilities of calling for outside help,—*i.e.*, the fire brigade,—although improved of late, are so unsystematically arranged and generally unknown that they are of comparatively little use. The amount of aid at once obtainable both for ordinary and serious fires is generally ridiculously small, partly owing to the brigade being numerically too weak to cope with the area and class of property of London; and although some authorities, when speaking of London fire protection, include the Salvage Corps as a protective force, this body (owned by the self-interested fire-offices) mainly exists to counteract some of the unnecessary water damage done by the firemen. Last, not least, we would mention that the fire inquests so often proposed do not as yet exist, except within the limited jurisdiction of the Lord Mayor,—that is to say, in what is called "the City." The *Times* of the 28th ult. shows us that London is not the only city in Great Britain where there is something amiss in matters of fire protection. It might be well if a country that has a national loss by fire* of about 9,000,000*l.* annually, and further bears taxes in the shape of insurance premiums to the extent of 6,900,000*l.* besides the rates and

* See *Times*, December 27, 1882.

voluntary contributions for fire brigades, paid more serious attention to the protection of its cities, and recognised Urban Fire Protection as a special science, as in some continental countries.

IN reference to our recent article on range boiler explosions, Mr. Kinnell, of the firm of C. P. Kinnell & Co., writes to us in a very dictatorial style to the effect that we have misled the public by stating that safety-valves on boilers will afford security from explosion, and denying that they will; his reason being that in the case of a red-hot empty boiler into which water is introduced the pressure of steam is too sudden and violent to allow time for a safety-valve to act. On inquiry we find that our correspondent is unable to cite any case within his own knowledge in which a boiler furnished with a safety-valve did burst under those circumstances. While he has no negative evidence to offer, we have the positive evidence of a case in which the boiler had been empty for a considerable part of the twenty-four hours, without the knowledge of the inmates of the house, and when the water came in at the usual supply time the explosion of steam was so violent that part of the brass-work of the safety valve was crumpled as if by a blow from a heavy hammer; but the boiler was entirely uninjured. The safety-valve was a spring one; we do not recommend these as the best, as there is always a possible element of going wrong in a spring; the dead-weight safety-valve is the most reliable, as that is merely lifting a weight, and there is nothing to get out of order. In reference to our correspondent's criticism we will go so far as to say that the fact of a safety-valve (even not of the best kind) having saved a boiler once under this extreme stress is not a proof that it will always do so, and that it is much better to avoid all the causes of danger, and have a safety-valve as well, which can do no harm, and is an important additional precaution. We may also add that it is possible to make an important improvement in safety-valves of this description for range boilers. They are at present made with much the same diameter of steamway as is allowed for relieving a boiler from gradually-increasing pressure, whereas the range boiler safety-valve is required especially to provide against a very sudden expansion, and its steamway should as it appears to us, be increased accordingly; a point which we commend to the attention of the makers of range boiler safety-valves. In the meantime the undoubted fact that one of the existing pattern of spring safety-valves, with these disadvantages, has saved life in averting a serious explosion, is a reason for thinking that it will do so again, though we admit that it may not be safe to assert positively that it will *always* do so.

ADDITIONS to the Record Office will shortly be commenced. The foundations are practically complete, and the superstructure will now be taken in hand. The extension will occupy a portion of the east side of Chancery-lane, the old houses in which have recently been pulled down, and the style chosen has been in accordance with the existing portion in Fetter-lane, designed by the late Sir James Pennethorne. The central portion, over the gateway, will be carried up as a tower, and the blocks on either side will have turrets at the angles. When completed the scheme will include a block at the northern end of the Chancery-lane front running back at right-angles to it, covering the site of the present Rolls House, incorporating the old Rolls Chapel, and connecting with the existing building in Fetter-lane. A lower range of buildings will run parallel with this on the south side, leaving a carriage-way which will connect Fetter-lane and Chancery-lane, forming, in fact, a long and somewhat narrow court-yard. The extensions are being carried out under the superintendence of Mr. John Taylor, of Her Majesty's Office of Works.

HERR SCHWERZECK, a young Viennese sculptor, has unquestionably won his archæological spurs by the interesting discovery revealed in the *Athenæum* for last week. If a moral may be pointed, this shows clearly enough how much the archæologist needs the artist, and also what a gain a new eye is, even to the best organised museum. Perception stales rapidly. As Herr Schwerzeck is engaged in the restoration of the Parthenon pediments, he possibly has views as to the naming of the figures; if so, now is the time to let us know them. Is he going to call his newly-placed figure Palæmon, the sea-god? We hope not, though tradition has existed to that effect. Palæmon involves Leucothea, and this Kabiric goddess is strangely out of place on purely Athenian soil. Perhaps he will have a word to say for Dr. Furtwängler's theory, to which we long ago called attention, but which the Museum catalogue steadily ignores (p. 129).

THE Rector and Churchwardens, in conjunction with the District Board, of St. John's, Hackney, intend to apply for a faculty allowing them to remove the tombstones and monuments in the burial-ground adjoining the parish church and the (old) Town-hall. The graveyard contains six acres, of which one and a half acres have been recently converted into an open space. Plans and estimates are prepared for laying-out nearly three acres of the remainder, at a cost of about 900*l*. In a letter from Lord Meath, printed in the *Times* of last Tuesday, we read that the Hackney Board of Works are willing to maintain these four and a half acres as an open space. The trees, including some fine horse-chestnuts and elms, were planted at the end of last century; some of the latter faded away a few years since. Lord Meath also says that the District Board are prepared to maintain another open space, if obtained, in this parish,—being the enclosure of St. Thomas's-square, belonging to St. Thomas's Hospital, and which, it is anticipated, the owners may perhaps give over for that purpose. The square could be placed in a suitable state at an estimated outlay of 350*l*. These, with one or two similar objects, are commended to the benevolence of the rich by the Metropolitan Public Gardens Association. The old Town-hall stands, it is believed, on the site of the "Church House," described by Lysons, and built in 1520 for parochial uses. The former parish church, dedicated to St. Augustine, was rebuilt at that time. In 1798-9 the nave, aisles, and chancel were pulled down; but they left the more ancient tower to serve as a belfry, and the Rowe chapel (1614). Mr. R. Simpson's book, printed for private circulation in 1879, contains some interesting notices of celebrated inhabitants of Hackney (including John Strype, the antiquary), and the monuments, whereof a few are preserved in the new Church of St. John. We may refer our readers to an article and a "Note" in the *Builder* of June 21, 1884 and December 5, 1891 respectively, for further particulars.

THOUGH one or two of the best names in the Society are little represented (Mr. Alfred Hunt having only one drawing and Mrs. Allingham only two), the winter exhibition of the Society of Painters in Watercolours is an admirable one, remarkable for the generally high level attained, and the varied interest of the drawings. The fact that Mr. Holman Hunt contributes a considerable number of drawings, grouped together at one end of the room, will give a special interest to this year's exhibition. These, except two sheets of portrait studies in silver-point, are to illustrate a new edition of Sir Edwin Arnold's "Light of the World" (we wish they were attached to some work which would have a more permanent literary value), and include a fine study of a bit of Byzantine architectural detail; two pen drawings, "The Hid Treasure" and "Christ before Pilate"; a water-colour illustration of "To him that knocketh it shall be opened," which is the most original in the collection, and other studies which we cannot admire in spite of their defiant originality. Among the drawings of more usual standard are several which resemble each other in that adoption of a level and frieze-like composition which has become rather a fashion among certain artists; Mr. Norman Tayler's "Golden Gatherings" for instance (3), a stream, a bank, and a group of gleaners passing along the bank, all in parallel lines across the picture; Mr. Tom Lloyd's "Sunrise on the Marsh" (16) not quite so geometrical, but with the same tendency, and a group of cattle passing along the centre; the same artist's "A Breezy Haytime" (39), in which this parallel arrangement of stream, bank, and figures is again employed; the figures are of much grace and character, but the effect of wind is hardly given, in spite of the bending rushes. Mr. A. Goodwin's "A Sea-Dirge" (4), a dark little picture with the ribs of a wrecked vessel in the foreground and the sea breaking in the distance beneath a bar of red in the sky, is a fine poetic thing. Mr. R. W. Allan has produced a grand and broad landscape sketch in his "Summer Day in the Highlands" (15); his Sussex and Rothenburg sketches are too black, but his "Across the Sands" (103) with the breezy tumble of clouds above, is fine. Mr. Thorne Waite's "Carting Corn" (31) is a powerfully-treated composition with the cart and horses in the immediate foreground and a wide distance of sea and sand-bank behind. Among others of the larger landscapes, Mr. Cuthbert Rigby's "Roman Bridge over the Brathay" (65) is a noble work; Mr. Tom Lloyd's "Sound of the Sickle" (86), a large drawing with two figures in the foreground under the shadow of a tree, and a slope of sunlit cornfield beyond, is rather pretty than powerful, one of the most finished but not one of the most effective of his works; but his "Close of a Midsummer's Day" (167) is in his finest style. Mr. A. Hunt's one drawing is a study of Cumberland mountains, "Armboth Fell" (163), a grand painting on a small scale (or the reverse way, if the reader likes to put it so). Mrs. Allingham's little "Isle of Wight Cottage" (177) is one of her most beautiful works. Mr. Albert Goodwin as usual presents us with various delicate studies of town scenery—"Canterbury from the West Gate Tower" (25), "The Via Fillunger, Lucca—Italian Moonlight" (99), "Salisbury Close" (146) and "Salisbury Cross" (158), "Oxford (from Radcliffe, looking east)" (115), and another view, the finer, looking west from the same station (175); he sends also a charming view in the pretty old village of Ightham (238), and a fine rather Turneresque picture of "the Carrara Mountains" (191). Mr. David Murray exhibits what seems a small Corot under the title "Evening" (193), Mr. Eyre Walker a characteristic landscape in which "Willows and Osiers" (197) are the prominent subject; Mr. Napier Hemy shows "Clovelly" (207) in a westerly gale, a heavy long swell setting in round the old stone jetty; Mr. Walter Field has a very real moonlight effect on the convent terrace at Amalfi (219); Mr. Charles Gregory paints the "Val d'Aute, Falaise" (235) in his characteristically thorough manner. There are various semi-decorative treatments of landscape by Mr. Walter Crane, which are to our thinking more curious than successful. Among works of architectural interest (other than those already mentioned) are Mr. Gregory's "In Caudebec" (24); Mr. S. J. Hodson's "Bridge over the Reuss, Lucerne" (32) and the same artist's "Palazzo Communale, Sienna" (43) and "Ponte Pietra, Verona" (179); Mr. Gregory's "A Corner in Rouen" (176); Mr. H. Marshall's "Chelsea Embankment" (322) and "St. Pancras" (349); and Mr. T. M. Rooke's "View of Vitré" and "Walls of Fougères" (338). Mr. Burne-Jones sends a study of a head for "The Golden Stairs" (364), and Mr. Henry

Wallis two superb "still life" drawings in the shape of studies of "A Persian Vase" (327) and "A Damascus Vase" (333), which in their way are unsurpassable.

AN interesting exhibition has been opened at 29, Queen's-square, Bloomsbury, by the Art for Schools Association, and will remain open until December 12. This Association, now becoming well known, introduces art education to schools of all descriptions by loan exhibitions of pictures. Good prints, engravings, etchings, lithographs, and photographs of beautiful and interesting works of art form the collections. Special arrangements with art publishers allow these to be supplied to elementary schools at greatly reduced prices. Not only are collections sent to schools on loan, but donations to poor schools of pictures are also made. The present exhibition contains specially selected framed pictures suitable for school prizes or Christmas presents; these are mostly either photographs, photogravures, autotypes, etchings or chromolithographs. Amongst artists represented by reproductions of their works are G. F. Watts and W. L. Wyllie, J. M. W. Turner, Leonardo da Vinci, Velasquez, Vandyck, D. G. Rossetti, Sir Joshua Reynolds, Rembrandt, Angelica Kauffman, Burne-Jones, Birket Foster, Dürer, Botticelli. Excellent reproductions, as these are, of the work of such artists cannot fail to make an interesting collection, well worth a visit. The Association is to be congratulated upon its capital selection, and the means employed to exert artistic influence over the minds of the young deserve success.

A TOLERABLY large collection of miniatures,—the property, we believe, of one owner,—is on view at the Fine Art Society's Gallery. The collection is as interesting historically and socially as collections of miniature portraits always are, and includes a certain proportion of really fine works in an artistic sense; some of these, however have been rather recently seen at the Burlington Fine Arts Club.

"THE Waterways of England" is the title of a small collection of good but rather mannered oil-paintings by the Hon. Stephen Coleridge, now exhibited at Messrs. Dowdeswell's Gallery. The artist is fond of a rich brown colouring, which is somewhat artificial though effective, and does not convey the sense of open-air nature. The effect of the white sail in the midst of a corner of dark trees reflected in dark water is well given in "The Wey at Pyrford" (19); and the large landscape "On the Norfolk Broads" (23) is a good work, spoiled to some extent by a rather muddy sky. In the same gallery is a collection of portraits and studies (un-catalogued) by Prince Pierre Troubetskoy, which are very "impressionist" in tendency, but show a great deal of spirit and appreciation of movement and colour. A life-size painting of a young girl holding a tennis-racket is full of life and colour, and there is an exceedingly clever half-length sketch of a woman in a large white cap, turning nearly away from the spectator. Prince Troubetskoy apparently, from an announcement posted on Messrs. Dowdeswell's walls, wishes to take up portrait-painting as a profession, and should have some success.

WHAT to say of the ninth exhibition of the English Art Club (Dudley Gallery) we hardly know, except that it appears to us that the pictures really worth looking at are such as are out of the professed line of artistic faith of the club, and would be notable anywhere. Such are Mr. Sargent's "Portrait of Miss Duncomb" (99), a little affected in attitude, but admirably painted, and more highly and smoothly finished than is usual with the painter, as if out of sheer contradiction to the aims of the impressionist exhibition to which it is sent. Mr. Shannon's portrait of Mr. Glazebrook (19), again, is quite in the *juste milieu*, and M. Helleu's dry-point studies of heads are admirable. Of the unfinished sketches (as we should call them) which make up a great part of the collection, some have effect and feeling, others are merely "unfinished." It may appear significant to the author of No. 2, for instance, to paint a mill-stream so that it looks like a wall; to us it merely seems that he cannot represent water, and has not tried. As to such things as Mr. Sickert's "Study of Expression" (43), Mr. Sauter's portrait (74), in which the face looks as if painted in dirt rather than in colour; Mr. Sickert's portrait of a music-hall songstress (91), and Mr. Wilson Steer's "Boulogne Sands" (8) and procession of yachts (96), it appears to us little short of an insult to educated persons to put such things on a wall for them to look at.

THE following advertisement appears in a London local paper:—

"— — ——,

Architect and Surveyor.

Surveys, Plans, Drawings, and Specifications for New Buildings and Alterations prepared.
Perspectives in Colour or Line.
Properties managed and Rents Collected.
Estates Surveyed, Plotted, Laid-out, and Roads formed and developed.
Mortgages negotiated.
Surveys for Dilapidations and Repairs, and Valuations made.
Sanitary Inspections undertaken, and Reports furnished thereon.
Quantities taken out and priced for competition.
Works measured up and Valued.

All Business entrusted to Mr. —— will be promptly carried out at nominal and fixed charges."

This is an amusing comment on the subject of "Architecture a Profession or an Art." It will not surprise most of our readers to learn that the advertiser is a member of the so-called "Society of Architects," which is endeavouring to purify and raise the status of the Profession by Registration.

LETTER FROM PARIS.

WE published (on February 14, 1891) a historical sketch of the different bridges which connect the two sides of the Seine in the neighbourhood of Paris, we think it may now be useful to complete this sketch by giving an account of some of the works which are being carried out to improve the bridges. Independently of the Pont Mirabeau, at the west of Paris, between the quarters Auteuil and Javel, of which the works will shortly be commenced, there is a question again raised of a "Pont du Louvre," the need of which is every day more felt. This bridge will put the Louvre quarter into communication with the Rue de Rennes, which will be continued as far as the Seine, and will relieve the congestion caused by the narrow Rue Bonaparte and by the Rue des Saints Pères, which is not on the axis of the bridge of that name leading to the Place du Carrousel. The municipal service is now employed in altering the "Pont de la Tournelle," that of "l'Archevêché," and the "Pont Nôtre Dame," which, on account of the size of its piers, is a source of serious danger to navigation. There is also a project to enlarge the pont "de la Concorde," which has become altogether insufficient for the increased traffic. This work is indispensable, at least if the work of making the Pont de Constantine is not carried out, which would be the inevitable consequence of prolonging the railway from Moulineaux and the Champ de Mars to the Esplanade des Invalides. There is, therefore, quite a plan of campaign, which will be connected in some degree with the preparations for the future exhibition, the site of which is still being discussed at the Ministère du Commerce. The partisans who uphold a Champ de Mars exhibition are trying to carry a project which meets with but little encouragement from the Parisian public. It is difficult to imagine what success a new exhibition can have which is a re-edition of the old. What is wanted is something new, and that can no more be offered in the Champ de Mars than in the Trocadéro. The Municipality of Paris has committed a grave error in preserving palaces which offer only a passing interest, and the expenses of which are a serious drain on the Municipal finances, besides being obliged to be constantly utilised by every possible means. If the Champ de Mars is definitely settled upon, it will be necessary to make a clean sweep of everything that is there, and have a great architectural composition for the new exhibition. On the other hand, the adoption of the "rond-point" of Courbevoie will entirely transform the bare plateau which overlooks Neuilly, and will bring traffic and life into a deserted and unfrequented suburban neighbourhood, which it will be easy to connect with the centre of Paris, by means of a railway leaving the Champs Elysées, and passing through the other quarters by the Ceinture line. As for the lawn of Bagatelle, it will certainly be, from a practical point of view, the best place, allowing of easy means of communication, and offering to architects a splendid setting to their buildings. This is the question submitted to the superior Commission appointed by Government, and it is probable that we shall very shortly know the result.

There is also a question of restricting the public from visiting the Salons of the Hôtel de Ville. At present, by some inconceivable carelessness, the Palais Municipal (in spite of the decorative works which are being carried on), is open to all comers. Every day groups of foreigners may be seen going about amongst the scaffolding, either alone or under the direction of a "gardien de Bureaux," who for a small sum gives a description of the pictures already finished. We cannot too strongly urge English tourists to be on their guard against these ignorant guides, who will tell them any nonsense, and who are only to be equalled in that way by Cook's cicerones at the Louvre Museum. Nothing is more edifying than to hear these municipal employés describing as an "Eclipse de Lune" M. Besnard's picture of the "Apothéose des Sciences," in the Salon des Sciences; or pointing gravely to "La Glorification de la Science," that fine work of M. Lerolle, and describing it as "Science Recompensing M. Pasteur;" or yet again showing, in the landscape gallery, views of Paris executed by "pupils of M. Puvis de Chavannes." The bewilderment of those who understand sufficient French, can be imagined, as likewise the upsetting of all their artistic notions. The Administration is awaking to the fact that this ridiculous way of making known to the public the art of the present day, in a place like the Hôtel de Ville, is hardly the thing; and soon guides, who are a little more educated, will be chosen, who will have to give to visitors a plan, with the pictures numbered, the subjects given, and the names of the artists who have painted them. Whilst we are speaking of the Hôtel de Ville, we may mention that the extraordinary ceiling by M. Benjamin Constant, which was exhibited this year at the Salon des Champs Elysées, and which was intended for the great Salle des Fêtes, will not be put in its place. The artist has recognised that in asking him for an important decorative painting the Municipality wished for an example of his best work, and not a rather unfortunate assumption of the style which M. Besnard has brought into fashion. He will therefore recommence the treatment of the same subject in a style based rather on that of the great Italian decorative painters.

The ceiling by M. Aimé Morot, "La Danse à travers les âges," will undergo some alterations in order to give to the groups a perspective better suited to a ceiling and bring out a little, by some bright lights, the parts which are at present a little too sombre. The putting up of the paintings in the various salons is going on. M. Galland has just put in their place the small subjects in the Renaissance style representing the "Métiers Parisiens." These compositions, which serve to heighten the rather dull effect of the fifteen cupolas of the long gallery adjoining the "Salons à Arcades," are cleverly designed and with a great respect for the architectural lines of the decoration; though perhaps they recall a little too much the style of the compositions made by Schnorr for the Nibelungen legend. We may mention also among the decorations a graceful painting by M. Clairin representing Parisian ladies in summer fashions, a landscape by M. Lapostolet, "Le Pont des Arts," the view of the Pont de

Solferino by M. Billotte, and that of the Luxembourg by M. Harpignies.*

It is difficult to account for the picture by M. Blanchon, who has painted, as a decoration to the Salle des Fêtes, a group of vulgar "ouvriers" in dirty garments, a picture which looks all the more out of place from the contiguity of the allegorical cupola paintings by MM. Picard and Risler, which are really decorative in effect. M. Puvis de Chavannes has completed his masterly decoration scheme by four escutcheons with allegorical paintings of The Seasons. In the adjoining room M. Paul Laurens has completed a new panel representing Étienne Marcel protecting the Dauphin at the moment of the murder of the Marshalls of Champagne and Normandy; a fine and powerfully executed historical painting, though one may reproach the artist with having given a singularly vulgar attitude and bearing to the future King of France. Is this a concession to the democratic prejudices of the Municipal Council?

The Louvre has acquired a splendid set of chessmen in carved ivory, of the twelfth century, presented by M. Stein, and also some curious miniatures by Muneret, given by M. Ch. Nuitter, the archivist of the Opera. The Cluny Museum has received from the Académie des Sciences one of the most remarkable automata of Vaucanson, the famous jointed asp made for the representations of the "Cleopatre" of Marmontel. This little mechanical marvel completes the collection of automata by Vaucanson at the Museum. To the Carnavalet Museum has been added the portrait of Felix Pyat, which was purchased by the Municipality of Paris. The painting is by E. Chantalat.

There is much artistic news at this time of the year. We may however mention the numerous drawings which are being exhibited at the Hôtel Drouot, bearing the well-known names of Forain, Henri Pille, Willette, &c. There is much talent in these drawings, which have been published in the "Echo de Paris." Unfortunately, they are of a kind of art of which there has been a good deal too much in Paris of late years, and against which a formal protest has been made by a society presided over by M. Simon, with the object of putting down "La licence des Rues."

We may mention also the exhibition, at the Georges Petit Gallery, of the conscientious and original nude studies of M. Adolphe Lalire; also the collection of photographs brought by Captaine Binger and M. Marcel Monnier their explorations at Ivoire and Kong. This last very interesting exhibition is held at the École des Beaux-Arts, under the authority of the Under-Secretary for the Colonies.

Thanks to the addition of the Hôtel de Chimay, the École des Beaux-Arts is now considerably enlarged, and the students have at their disposal eleven new ateliers as well as some large and well-ventilated "loges" for the competitors for the competitions of the School and for the Prix de Rome. Agreeably to the wish expressed by the Prince de Chimay, the façade of the hôtel, which stands at the back of a large courtyard now transformed into a garden, has been left untouched. The garden has been filled with statues, nearly all of which are "envois" from the Villa Medici.

We have to conclude with mentioning the melancholy death of a clever young painter, M. Fernand Blayn, who has committed suicide in a fit of mental distress. M. Blayn was a pupil of Cabanel and of Lerolle. He had obtained an "honourable mention" at the Salon of 1879, a 3rd medal in 1886, and a bronze medal at the 1889 general exhibition. He exhibited two noteworthy pictures at the last Champs de Mars Salon: "Loge d'Artiste" and "Fête à St. Cloud." This sad termination to an apparently promising career has caused great grief to his numerous friends.

Church, New Tredegar, Monmouthshire.—The corner-stone of a new church has just been laid at New Tredegar, by Mrs. J. L. Smith. The church, which is dedicated to St. Dingat, is intended to accommodate 400 persons, with future provision on the south side for a new aisle. It is designed in the Early English style and built of local stone, with terra-cotta dressings. The contract has been entrusted to Messrs. Williams & Sons, of Trefeinon, Talgarth, Messrs. Seddon & Carter and James & Morgan, Cardiff, being joint architects.

* This introduction of landscape and architectural pictures as permanent wall decoration appears to us to be very questionable in an æsthetic sense.—Ed.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

Another Scheme of Nine Reservoirs.

From the mass of evidence taken at the last sittings* of the Commission, we select for immediate notice that relating to a scheme of proposed storage reservoirs submitted by Mr. Walter Hunter, C.E., Director, and Mr. Alexander Fraser, C.E., Engineer, of the Grand Junction Company. The positions of the reservoirs, nine in number, were shown on a map, and they were indicated by the first nine letters of the alphabet. Four of the sites (northern) are north of Staines, in an angle between the river Colne and the road that runs north-east from Staines to Hounslow parallel with the London and South-Western Railway. Three sites (southern) are on the south side of the main road between Staines and Hampton, and between that road and Laleham and Littleton. The remaining two (western) are in the angle between the Thames and the river Wraysbury. The map showed a proposed intake on the north side of the Thames just above the mouth of the Wraysbury, a conduit crossing that stream and the two branches of the Colne, a pumping-station close to the reservoir A of the northern four, and the conduit continued from A to the three southern reservoirs E, F, and G, and thence to the present works of the water companies at Hampton. The four northern and the three southern sites are in Middlesex, and the two western sites are in Buckinghamshire. These nine reservoirs are on the Thames and near London, while the nine proposed by Messrs. Marten & Rofe† are remote from London, are on tributaries, and would feed the Thames itself.

Statements of Messrs. Hunter and Fraser.

The statements on which Mr. Hunter and Mr. Fraser were examined included a number of calculations showing the amount of storage required at the end of each of the ten years up to 1941, providing that the minimum flow over Teddington weir shall be 200,000,000 gallons per day. In a joint report to the Company, they said:—

"Mr. C. J. More, C.E., the Engineer to the Conservators of the River Thames, handed in to the Royal Commission a diagram showing graphically the volume of discharge at Teddington Weir during the years 1882-1891 inclusive, and also showing the quantity of water taken by the Water Companies as given in the monthly reports of the Official Water Examiner. From this diagram, and from tables handed in by Mr. More, it will be seen that the maximum volume of discharge on February 16, 1883, was 9,640,000,000 gallons in twenty-fours hours, and the minimum discharge 153,900,000 gallons in twenty-four hours on August 14, 1887. Experience has shown that the minimum discharge of 153,900,000 gallons has not been attended with any harmful results, and it is the opinion of some engineers that all the water coming down the river, with the exception of 5,000,000 gallons per day for the navigation, might be abstracted without detriment. We propose, however, to provide sufficient storage to ensure that, after taking out the quantity required by the Companies, not less than 200,000,000 gallons per day shall pass at Teddington Weir, thus increasing the minimum recorded flow by 46,000,000 gallons per day, or 30 per cent.

Having proved that the Thames will in 1941 be more than equal to the utmost demands likely to be made upon it, the next question to be considered is where the proposed reservoirs should be constructed. It appears to us evident that they must be in some place where they will not only be available in times of short water in the Thames, but would also fulfil the requirements of the Local Government Board, so strongly insisted on by Major-General Scott and Dr. Frankland, viz., that Thames water, when the river is running above its average flow, should be stored in reservoirs before being filtered and distributed. It appears to us that this condition can be best fulfilled, at a reasonable cost, by the construction of the storage reservoirs near the present Thames Works of the water companies.

—We have, therefore, examined the country between Hampton and Staines, and have come to the conclusion that there is ample land of small value in that neighbourhood, and a little higher up the river, which may be utilised for the purpose. The soil consists of gravel, about 20 ft. thick, resting upon clay, and is, therefore, well suited for the construction of reservoirs, and the beds of gravel and sand above the clay would be admirably adapted for an extensive system of natural filtration, similar to that now in use at Hampton. We have had borings made upon the ground, with the view of bringing direct evidence upon this point before the Royal Commission. The reservoirs would be 40 ft. deep, partly excavated, the soil thus removed forming the banks of the reservoirs, which would be secured by a puddle trench, the inner slopes being lined with concrete. The intake from the river would be above Staines, thereby avoiding any chance of contamination from that town or from the river Way. The reservoirs would be filled above the river level by pumping, the depth of water being arranged in accordance with the opinion of Dr. Frankland, that Thames water would be improved by storage in deep reservoirs. Conduits would be made to convey the water by gravitation to Hampton, and storage reservoirs would be formed in suitable positions, as shown upon the map accompanying this report. At Hampton the water would be delivered direct into the works of the Grand Junction, West Middlesex, and Southwark and Vauxhall Waterworks Companies; while branch conduits would supply the East London Waterworks Company at Hanworth, and the Chelsea and Lambeth Companies at Molesey. Of course, additional mains and pumping power would be required in the future at each company's works to deliver the water into their districts.

We have, in conjunction with Messrs. John Aird & Sons, looked into the cost of the storage reservoirs, with pipes, conduits, pumping machinery, &c. The cost of each set of works required at the different stations is shown in the following table, the second column showing the total storage required, and the third the storage proposed to be made:—

1901	1,834 mill. galls.	2,000 mill. galls.	£899,115
1911	3,260 ,, ,,	2,000 ,, ,,	363,985
1921	5,054 ,, ,,	2 000 ,, ,,	736,685
1931	8,485 ,, ,,	4 000 ,, ,,	725,585
1941	16,820 ,, ,,	8,000 ,, ,,	1,443,565
	Totals.....	18,000	£4,168,935

It may be presumed, however, that in any gravitation scheme for bringing water from a distant watershed, no pumping will be necessary for its distribution. It is, therefore, necessary to add to the capital cost of 4,168,935*l.* above arrived at, the cost of the capital sum to be expended in additional pumping power for the distribution, and a sum for the capitalised value, upon a 3¼ per cent. basis, or say thirty years' purchase, of the annual pumping charge. The cost of the work as compared with a gravitation scheme will then run out as follows:—

Total expenditure of capital in land, easements, storage reservoirs, conduits, pumping engines to pump into storage reservoirs, and incidental works		£4,168,935
Total capital cost of 26,940 horse-power to pump water into districts in 1941 at £45, with buildings ...		1,212,300
Total capital expenditure ...		5,391,435
Annual pumping charges on 256,000,000 gallons per day, based upon present cost to Waterworks Companies, of £2·50 per million gallons (Lass's Tables) £233,600. As the whole of the power will not be required till the end of the fifty years it will be fair to capitalise only three-fifths of this annual charge. £139,160 capitalised at thirty years' purchase	£4,174,800	
Capitalisation of annual charge, three-fifths of £7,580 for pumping into reservoirs at thirty years, £4,548 × 30 ...	136,440	
		4,311,240
		£9,702,675

The expenditure of the capital,—and this appears to us to be a great merit of the proposed scheme,—will only have to be made as it is necessitated by the needs of the growing population, and may be advantageously divided into cycles of ten years, as shown in the tables. In this way capital will only have to be expended when the outlay is justified by the increased demand for water, with a corresponding increase in the amount of water rental. Should, moreover, the future population prove to be over-estimated,

* For reports of previous sittings of the Commission, see last volume of the *Builder*, pp. 418, 435, 456, 480, 503; and current volume, pp. 10, 29, 47, 71, 82, 103, 126, 298, 316, 338, 353, 375, 396.

† See *Builder*, pp. 318, 353, 375, *ante*.

no large wasteful expenditure of capital will have been made.

On the other hand, one of the principal economic objections to any scheme for bringing water from a distant watershed is that the main bulk of the expenditure must be made in anticipation of still far distant wants, with the consequence that it would for many years be entirely unremunerative. Sir Frederick Bramwell points out in his evidence that capital expenditure, anticipated by sixty years, increases the cost of works to eight times the amount originally expended.

As before stated, we leave the details of the storage reservoirs necessary to enable the Lea to meet the increased supply of 12,000 000 gallons per day, with which we have credited it, to the engineers of the New River and East London Water Companies. Presuming that they could be constructed at the same rate per million gallons of daily supply as those we propose for the Thames, their cost would be about $\frac{216{,}000l. - 5{,}391{,}435l. \times 12\,000{,}000 \text{ gallons}}{300{,}000{,}000 \text{ gallons}}$.

The additional cost of bringing 12,000 000 gallons per day of additional supply from Wales would be, if taken at the same rate per million gallons of daily supply, as above estimated, 1,800,000*l.*

The above calculations assume, in common with all schemes for a supplemental supply from a distant watershed, that the present works of the companies will be utilised. They will, therefore, always form an important and integral part of the London waterworks system, whether the source of supply be taken from the Thames and Lea basins, from a distant watershed, or from all three of the sources indicated.

Although we have taken Mr. Binnie's estimate of population as the basis of this report, it must not be supposed that we endorse his figures, which represent the extreme views of the unreasoning opponents of the excellent water supply which the natural position of London ensures, at a moderate cost, to its inhabitants. We submit that one great merit of our scheme is that it may be adapted, within the limits set forth, to any increase of population, large or small, which can be reasonably expected for many decades of years to come.

We desire, in concluding this report, to summarise as follows the conclusions at which we have arrived :—

1. That the water obtainable from the Thames and Lea and from wells in the basins of those rivers is good in quality and suitable for the supply of London.

2. (*a*) That there is a sufficient flow of water in the Thames and Lea basins to provide for the supply of London for the next fifty years, taking the estimate of Mr. Binnie as a basis. (*b*) That the scheme of storage reservoirs near Hampton and Staines, proposed in this report, will provide against drought, will prevent the necessity for drawing water from the river during the first fifteen days of any flood, and will comply with the recommendation so strongly insisted on by the Local Government Board, that the water abstracted when the Thames is running above its average flow shall be stored in deep reservoirs before being distributed. (*c*) That the works in the shape of storage-reservoirs, pumping-engines, &c., will cost about 5 391,435*l.*, securing a minimum flow of 200,000,000 gallons a day at Teddington, and providing in 1941 300,000,000 gallons a day for water supply, while similar works on the Lea will probably cost about 216,000*l.* (*d*) That by carrying out these works the minimum flow of the Thames will be increased by 30 per cent.

3. That the utilisation of the Thames by the scheme of storage reservoirs which we propose will be far less costly than any scheme for bringing water from a distant watershed, and will, therefore, be more advantageous to the public interest.

We submit, therefore, lastly, that while the companies have in the past admirably fulfilled their statutory obligations by giving a good and ample supply of water, they will be able, by the expenditure of a moderate amount of capital, as the necessity for the proposed works arises from the increased demand for water resulting from the growth of the population, to render in the future equally efficient service to the water consumers of the metropolis."

Approval of Mr. Hawksley and Sir F. Bramwell.

In a supplementary statement Mr. Hunter mentioned that he and Mr. Fraser had been authorised to lay their report before Mr. Hawksley and Sir F. Bramwell, and these gentlemen had thereupon given the following opinion :—

"We have carefully considered your proposal for increasing, and otherwise improving, the capabilities of the River Thames for the supply of the metropolis and its vicinity, when and as may be wanted at any time or times during the ensuing fifty years, and we are pleased to have the opportunity of stating that we approve in general terms of that proposal.

As to the quality of the water, we think you are fully justified in relying on the evidence of the cited chemists.

With respect to the capability of the Thames, when aided by the suggested storage reservoirs, to afford a supply of 300,000,000 gallons *per diem* for waterworks purposes, while leaving a minimum of 200,000,000 gallons per day to flow over Teddington Weir, we have no doubt that these quantities can be obtained by the suggested means, but we are of opinion that so large a quantity as 300,000,000 gallons per day for waterworks purposes will not be required, even at the end of fifty years.

We think that if the water of the Thames be derived and stored as proposed, and be afterwards filtered in the usual manner, it will be improved, and will be free from any stain due to floods, and we are further of opinion that no sensible deterioration of its quality would occur; even if flood water were occasionally pumped into the reservoirs, it would settle and bleach.

With regard to the proposition to bring the suggested 210,000,000 gallons *per diem* supplemental water from Wales, we are of opinion that it would not be feasible to do this by means of an open channel; and further, we are of opinion that such supply would certainly involve an outlay of at least 30,000,000*l.*

In conclusion, we beg leave to express our opinion that the sites proposed for the reservoirs are suitable for their intended purpose, and that the reservoirs are capable of being constructed at a moderate expense; and we think that this project may very properly be placed before the Commission as one, amongst others, to show that the watershed of the Thames affords ample facilities for increasing the supplies of water to the metropolis, when and as they may be required; and we will willingly support this view by our oral evidence, if your Board, on further reflection, see fit to call upon us for that purpose."

Mr. Hunter's Evidence.

Mr. Hunter said that he was struck with the small percentage of water taken from the Thames in comparison with that abstracted from the Lea, while the greater abstraction from the Lea does not interfere with the navigation or prejudice people living on the banks. This fortified him in the opinion that there is plenty of water in the two valleys to supply the needs of London for many years. He thought it desirable to submit to the Commission a definite scheme of storage reservoirs, and therefore Mr. Fraser and he had prepared this scheme. The proposal was that the water should be taken at Staines, and the reservoirs constructed as they were required. The reservoirs would be 40 ft. in depth. The water would flow in by gravitation to the lowest 10ft., and the rest would have to be pumped. The gravel bed varied in depth from 10 ft. to 25 ft. before the clay was reached, and it was proposed to carry the trenches into the clay. It might be a little troublesome, on account of the water in the gravel, but it could be done. The estimates had been worked out in conjunction with Messrs. Aird & Sons. The conduit was proposed to be placed in the clay itself. The worst flood-water would be allowed to pass. Storage was provided for four months of drought and fifteen days of flood. The estimates before the Commission showed that 153,000,000 gallons a day were expected to be obtained from the Lea Valley (river and wells) and the Kent wells. Assuming the total supply required to be 433,000,000 gallons, 153 000,000 from the Lea and wells would leave 280 000,000 to be taken from the Thames. That was on the assumption (as Mr. Hill remarked) that all the water expected would be got from the Lea and the wells; but he had not included what geologists said could be got from the chalk. As to the effect upon the Lea district of pumping a larger quantity, he was not prepared to express a definite opinion; but he did not think that what was proposed to be taken would have a great effect upon the river supply.

Sir A. Geikie: Supposing that these reservoirs which you have sketched on the plan are constructed, what do you imagine will be the effect; will there be any effect on the flow of the Thames; what effect do you suppose they would have?—They will not have any special effect upon the flow of the Thames. We shall allow always the 200,000,000 gallons to go down the River which the Thames Conservancy wish to have according to their instructions issued to Messrs. Marten & Rofe. Beyond that I do not see that it would have any special effect at all.

You think that even that quantity might be produced without injuring the traffic in the river?—I think so.

Mr. Mansergh: You have never heard of any complaints as to the water that has been pumped from the Lea Valley affecting the navigation, I understand. Is that what you meant us to understand?—I have never heard of any complaint.

You never heard that the companies were pumping so much water as to deplete the navigation?—I have heard this: I have heard the Lea Conservancy say that they have had to do more dredging down the river in the lower reaches of the navigation owing to the fact of the companies taking so much water out.

That is so?—Yes, that is so.

Mr. Fraser's Evidence.

Mr. Alexander Fraser, who had given evidence at an early stage of the inquiry, was re-called and examined on this scheme.

Sir A. Geikie: Would you kindly tell us the conditions under which you proposed this series of reservoirs?—Mr. Hunter, I think, has told you what led up to it. I was instructed by my Board to assist him in drawing up this report, to look at the ground, get borings, and so on, and put it into a practical shape, which I attempted to do.

Would you tell us generally what is the depth of gravel over that ground?—The depth of gravel varies. There are 20 ft. to 24 ft. of ballast and sand, generally speaking, all over that area, and the bottom is London clay.

Mr. Mansergh: Does that apply to all the sites of reservoirs that are on that plan?—Yes. Of course, there are many other sites equally available, but we selected those as convenient. They happened to be without any roads or houses upon them; they seemed to be singularly well adapted.

Sir A. Geikie: Do you propose to dig down to the clay in these reservoirs?—We should dig down to the clay, as shown on the section there, and bring up a puddle wall

The puddle-wall is in the clay, but what about the floor of the reservoir?—We should excavate the ballast, make up the bank, and that is all we should do; we should not floor the reservoir with anything, but leave the ballast. We have done that at Hampton. We have made, I should think, a mile of puddle-trench there, through that same ballast, in some cases 40 ft. deep. Of course, the deeper you are, as you are aware, the more trouble and expense; but still it is just a question of pumping in short lengths, and keeping the water out while you get this in. That is the way we have made our reservoirs at Hampton.

Mr. Hill: I suppose in the large area of these reservoirs you only want material to make your embankments?—That is all.

Here it is represented at about 6 ft. in depth?—It is about 10 ft.

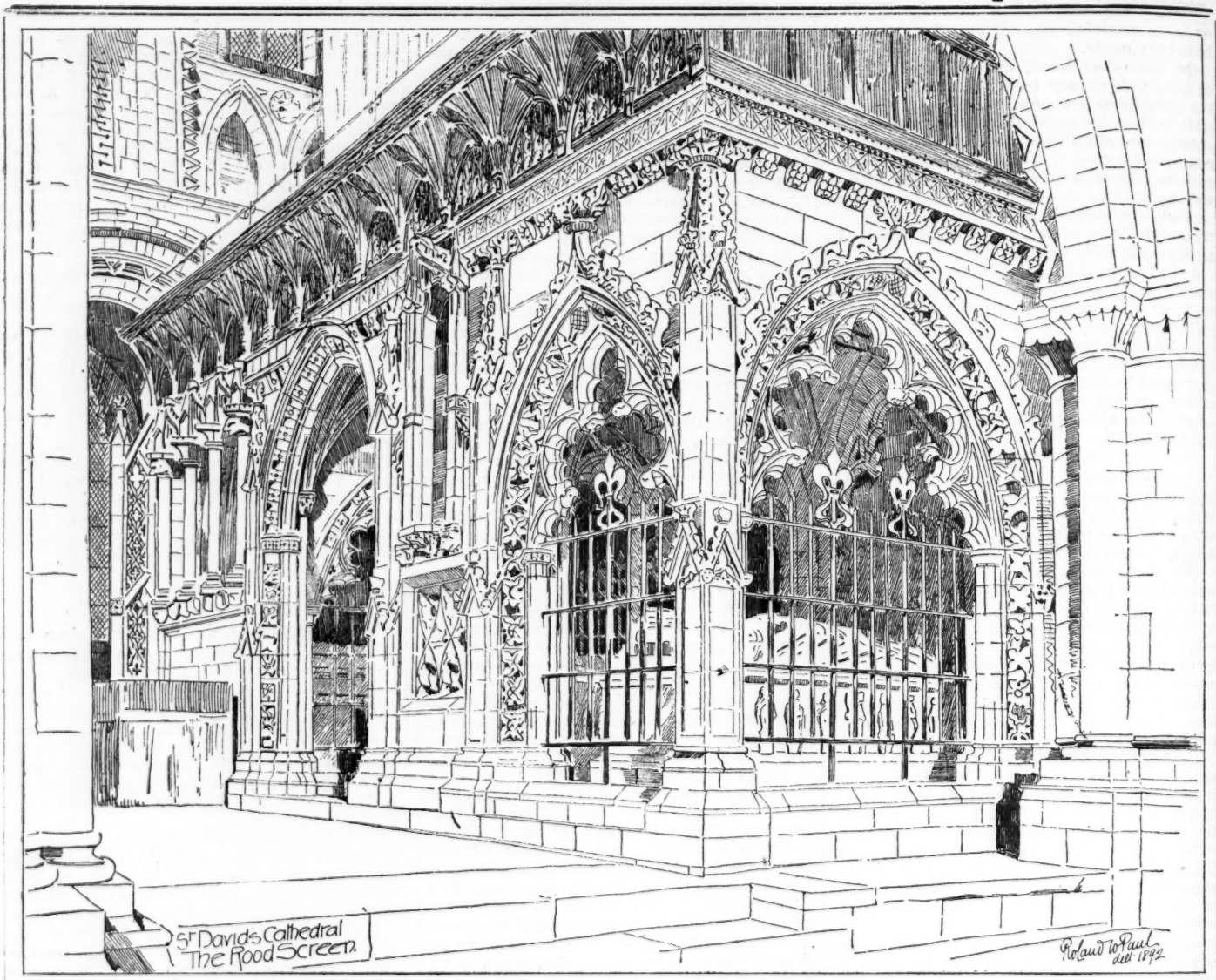
Will that give you all the material you require for your embankment?—Yes.

Of course the bottom of the reservoir you need not do anything to?—Nothing.

It is a gravel bottom?—Yes.

The sides I suppose, down to a point, you can protect with concrete?—Yes, to meet the effect of the wind,—against the wind. Each reservoir of water covers 200 acres and is 40 ft. deep, and that represents 2,000,000,0000 gallons. It is proposed to make them in alphabetical order,—first of all to make an intake; it is thought desirable to go above Staines while we are about it to bring it down to Hampton, that is seven miles,—by the river it is about five miles more. If you have a pumping-station there and make Reservoir A and pump into that, and then pump into the next one B, and so on, when they are all down the water could flow through the whole lot of them, any series of them, or through any of them, down into the culvert, and so keep moving, if necessary.

[*Continued on p.* 442.



Illustrations.

ST. DAVID'S CATHEDRAL.*

THE old saying that two pilgrimages to St. David's were equal to one to Rome is still, though in a different sense, to some extent true. This, by far the most important of the Welsh cathedrals, is the most difficult of approach, and is the only Cathedral city in England or Wales that is still without direct communication by railway with the outer world, and its isolation gives an additional charm to its surroundings, which are naturally wild and extremely picturesque. The Cathedral itself is situated on low ground, in the narrow valley of the River Alan, which flows within a few yards of the west front, and passes to the sea about a mile and a half distant. The high ground rises on the south and east sides, and, to some extent, on the north, and provides that shelter which was, no doubt, the chief idea in the minds of the founders in choosing the site. The most effective views of the building are from this high ground eastward, embracing not only the Cathedral, but St. Mary's College on its north side, and the grand ruin of Bishop Gower's Palace beyond the Alan on the west. The tower and gable of St. Mary's College appear on the right hand of the view here given; from this point, however, the Palace is invisible, being hidden by St. Mary's College and the foliage about it.

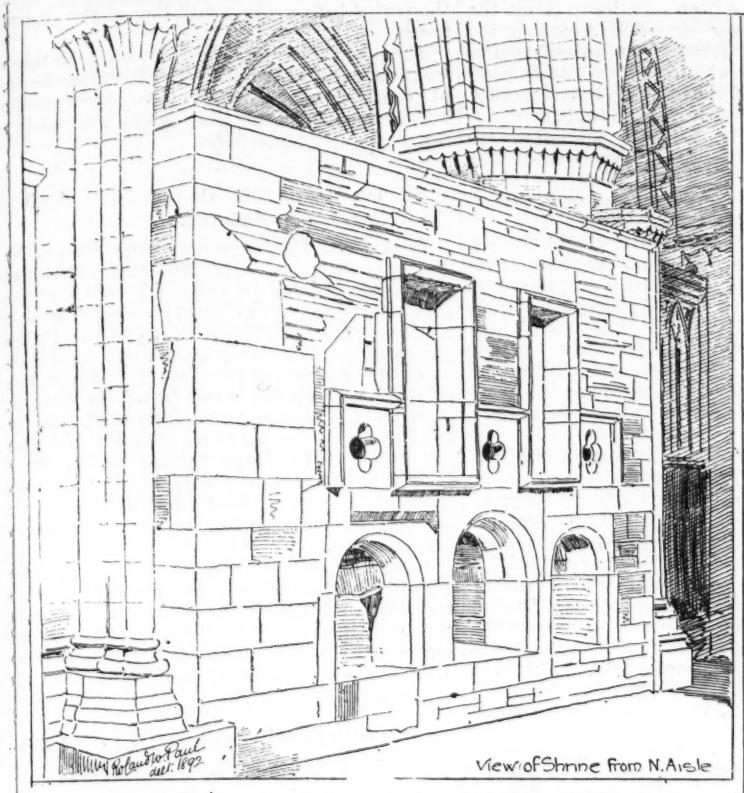
The Cathedral, a building with a total length of slightly over 300 ft., is a cruciform structure with a central tower, and it retains examples of nearly every period of architecture from the time of its commencement by Bishop Peter de Leia in the latter part of the twelfth century (1176-1198) to the present time. The stone used came largely from Caerfai, not far distant, on the coast, and the material for the recent restorations has been obtained from the same neighbourhood, although the more recent stone is not of the same colour as the old. With its rugged surroundings it is not surprising that the exterior of the fabric shows little attempt at ornamentation. Beyond the tracery of the Decorated windows in the aisles, one or two Perpendicular ones, and the parapet and canopied niches of the tower, all the external features have been kept as plain as possible. The only portion of the fabric which has been rebuilt to any considerable extent is the outer portion of the west front, a restoration by the late Sir Gilbert Scott, which took the place of the west front erected by Nash at the end of the last century at a time when the Cathedral must have been in a very dilapidated condition. The Lady Chapel and the aisles flanking what is known as Bishop Vaughan's Chapel are, as will be seen on reference to the view, still roofless. The window tracery of these parts of the building is modern, their design having been, to some extent, recovered from fragments found *in situ*. The central tower piers, being in a dangerous condition, were underpinned and largely rebuilt and restored with the old material by Sir Gilbert Scott, a dangerous and difficult work happily crowned with success. The tower is of more than one date, the first stage clear of the roofs being Decorated, and part of Bishop Gower's building. This in turn has had a Perpendicular belfry stage of Bishop Vaughan's time added, with an open parapet, and angle and intermediate pinnacles. A prominent feature in the eastern views of the church is the three-storied building projecting eastward from the north transept, the lower portion being formerly the Chapel of St. Thomas of Canterbury, and the upper the Chapter-house. The Chapter-house now occupies the portion on the ground level. The upper stories are approached by a stair from the north aisle of the Presbytery. A smaller chapel, now used as a vestry, projects from the corresponding wall of the south transept, and was rebuilt at the time of the last restoration. The only other portions of the building which break the main lines of the exterior are the south porch, at the second bay eastward of the nave, and the buttresses,—some modern, others dating back to the fifteenth century,—which support the north side of the nave, and encroach on the cloister court still existing in the space between the church and the College of St. Mary.

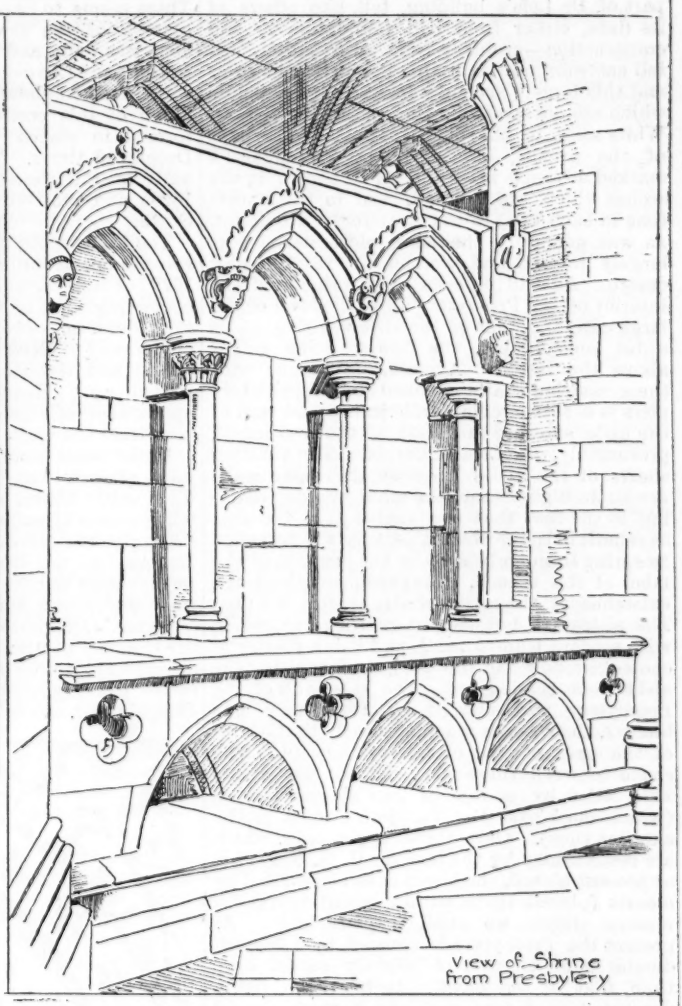
In strong contrast with the simplicity of the exterior is the richness of the interior. From the work of De Leia to that of Bishop Vaughan every effort seems to have been made to render the interior of the Cathedral a fitting and imposing setting for the shrine of St. David which it contained—the great patron saint of the Welsh Principality. Of the early church preceding De Leia's reconstruction we have no trace, but there is good reason to believe that the original site of the first church was retained. The western piers of the tower, the west wall of the transepts, and the whole of the nave with the exception of its outer southern casing, the porch, and the inner portion of the west front, are of De Leia's date. The arcade is of six bays of wide span, circular arches rising from alternately octagonal and circular piers, having semi-attached shafts at the cardinal points. Over the arcade, and divided from it by a bold string-course, is the upper stage of the design, which includes the clearstory and triforium under an enclosing arch. The triforium consists of two pointed arches with a circle between them, the clearstory windows having been simple round-headed lancets now in some cases filled in with later tracery.

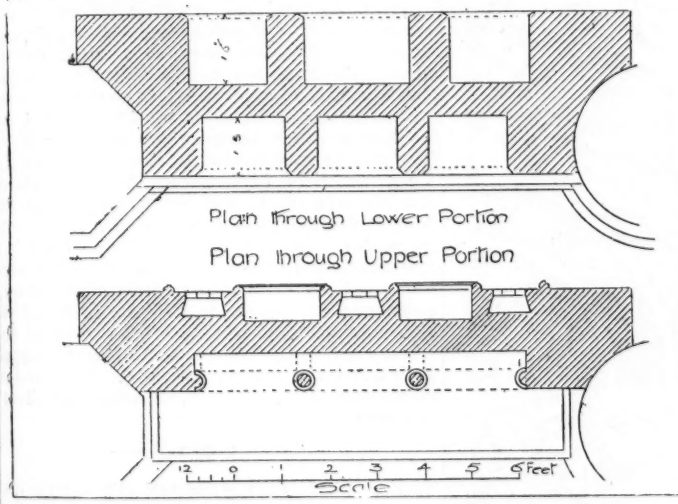
All the work is Transitional in character, combining the solidity of the Norman with the pointed arch of the thirteenth century. Ornament has been lavishly bestowed wherever possible, and the main arches, and the smaller ones above them, are full of rich detail characteristic of the style and date. Over all is the late roof, with elaborately-carved pendants dating from the time of Owen Pole, treasurer, 1472—1509. The whole may take rank as one of the most striking and elaborate interiors in the kingdom.

The aisles were raised in Decorated times, and some of the windows are of this date,—others are modern copies. The aisles have wooden roofs, although vaulting shafts remain against the outer walls.

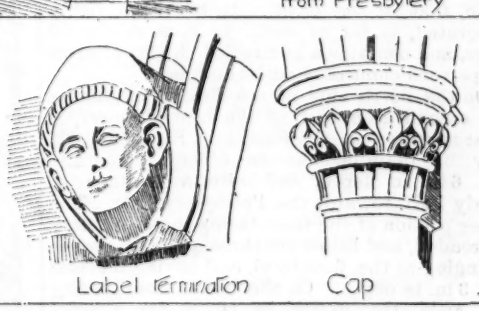
* This series of illustrations of the Cathedrals of England and Wales was begun in our issue of January 3, 1891. A list of those already illustrated, with particulars of future arrangements will be found on page 450.

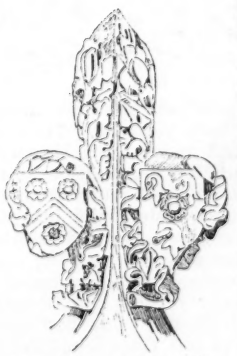


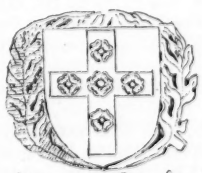


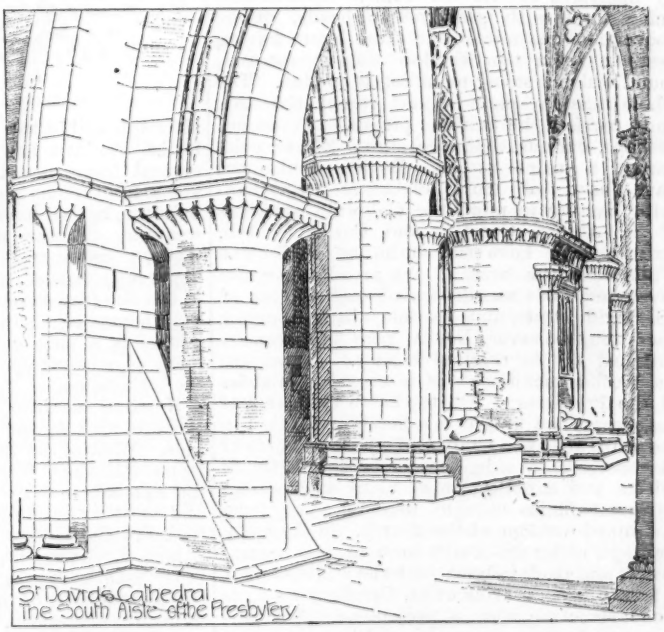


St David's Cathedral
The Shrine of Saint David on the north side of the Presbytery




Poppy head from the Stalls


Arms of the See from a Boss in S Aisle of Presbytery


St David's Cathedral
The South Aisle of the Presbytery

The portion of the church east of the nave is considerably raised above it. In addition to the steps, the whole of the nave floor slopes up gradually eastward, and by this means full advantage is taken of the natural slope of the ground to give extra dignity to the interior. At the last pair of main piers eastward are three steps to the platform, which stretches across the nave in front of Bishop Gower's rood-screen, a very beautiful specimen of fourteenth-century work, rich in its details, but with a judicious use of plain wall-space giving a reserve and dignity to the whole. Practically it is divided into three sections. In the centre is a doorway which leads through a vaulted vestibule to the choir. On the north side is a range of canopied niches, apparently earlier work re-used, forming a reredos to the altar of (?) St. John. At the extreme southern end is the tomb of the bishop, Gower (1328—1347), during whose episcopacy the screen was erected. It consists of a recumbent effigy on a tomb surrounded by small figures on pedestals attached to its side, the whole enclosed in a vaulted space, having richly cusped arches on the west and south sides, with grilles. On either side of the main entrance flanking the first bay of the vestibule are two other recumbent effigies of priests.* The staircase to the loft is entered at the north-west angle of the screen (see plan). Over the screen is a wooden cornice and cove, restored from fragments of the vaulted cove which were in existence. At present the organ occupies the space over the screen. The general design will be more clearly understood by reference to the illustration at the head of this article.

Five more steps lead from the screen platform to the choir, giving a total of eight in all from the nave level. The choir stalls are arranged under the tower, and returned against the back of the rood-screen. They are of fifteenth-century date (Bishop Tully 1460-1480), and have misereres, quaintly carved. There is a bishop's throne, of wood, on the south side, and to all appearance a mixture of fourteenth and fifteenth-century work—portions, doubtless, of earlier fittings of Gower's period, to which also the unique parclose screen which encloses the choir proper, and divides it from the Presbytery, belongs. The central tower which formed

* The No. 26 on the plan has been placed in error opposite the Altar of St. John, instead of being opposite the tomb on the north side of the entrance, corresponding with 25.

part of De Leia's building, fell, like others of its date, either from bad foundation or bad construction—probably from both causes. It fell eastward and laid the Presbytery in ruins and this largely accounts for the curious points which are observable in the present Presbytery. While some of the details,—notably the caps of the arcade,—are early in character, a marked advance in the style is shown in the arches which are pointed, and in the lancets (one in each bay) of the clearstory. No doubt, as was generally the case, old material was largely re-used and worked up in the new design. As will be seen by the sketch of the interior of the Presbytery aisle, the level of the large caps and that of the aisle vaulting shafts differ considerably, the former being raised above the latter. Agreeing in height with these vaulting shafts attached to the presbytery piers is a semicircular arch in the east wall of the aisle, showing the level of the vaulting of, presumably, De Leia's Church. The vaulting shafts of the aisles (against the outer wall) are again higher than the main arcade, pointing to the fact that the vaulting of the aisle as rebuilt in the thirteenth century was intended to spring from corbels above the junction of the label of the arcade, disregarding entirely the existence of the earlier shafts against the pier. The aisles are, however, at present covered in with modern lean-to roofs, and it is a matter of conjecture how far the project of vaulting the aisles was carried out. The east wall of the Presbytery was pierced by three very fine lancets, their heads reaching nearly to the level of the apex of the clearstory lancets. The space between these and the roof was, and is still, filled by a row of four shorter lancets (which show over the Vaughan Chapel in the exterior view). Only these upper ones, which are restorations by the late Sir G. G. Scott, are at present glazed, the lower ones being filled by mosaic (placed there within recent years) for reasons which we shall explain later. At present the Presbytery is covered by a Perpendicular panelled roof of slightly earlier date than that of the nave. It has been richly decorated, as far as could be done on the old lines, and contains a number of shields of arms of persons connected with the fabric.

On the north side of the Presbytery, under the second arch east of the central tower, is what is known as the Shrine of St. David. It may be described as an oblong structure, 3 ft. 6 in. in depth, and with a frontage of nearly 12 ft. towards the Presbytery aisle. The upper portion of the front facing the Presbytery is arcaded, and below are three pointed arches springing at the floor level, and having recesses 1 ft. 3 in. in depth. On the north front, facing the aisle, the design is of a far simpler character, the plain wall being merely pierced by apertures of various forms,—those below being three with semicircular heads, others above them quatrefoils, and these latter having between them two shallow oblong recesses, round which a string moulding is carried. The whole has a plain mould round the top, and carried the shrine proper. It seems, perhaps, curious that the shrine of so celebrated a saint as St. David should not have been of more elaborate workmanship, bearing in mind the elaborate erections of St. Albans, Chester, and Christ Church, Oxford. We have the authority of Browne Willis that the back of the arcading on the Presbytery side was decorated with figures of SS. David, Denis, and Patrick. In its present condition, however, but a poor idea can be obtained of its original beauty. There are many other monuments of interest in the aisles of the Presbytery. On the north side (east of the shrine) is a knight in a heraldic *jupon*. In the south aisle is a similar effigy, two figures of Bishops side by side, two or three effigies of priests, and a collection of slabs with crosses and semi effigies brought here for safety from the ruined portions of the church. In the north transept, under the north arch of the central tower, and back to back with the stalls, is what is known as the shrine of St. Caradoc, a simple stone structure with a projecting upper portion, and having recessed apertures similar to those on the shrine of St. David, already described.

That portion of the church east of the Presbytery is one of the most curious points in the planning of the Cathedral. The aisles, instead of being returned round the east end of the Presbytery, were carried a sufficient distance eastward to allow a space of 15 ft. (from east to west) east of the Presbytery wall. There seems to have been a desire to retain the glazing of the lower lancets. A connecting aisle was built, and formed the ante-chapel to to the Lady Chapel, which projected again eastward, and completed the fabric in that direction. Much of this portion is Early English, transformed in places by Gower's alterations in Decorated times. The Lady Chapel itself was built in the time of Bishop Martyn (1290—1328), and received additions also from Bishop Gower.

The last structural addition to the Cathedral was the construction by Bishop Vaughan (1509-1522) of his chapel east of the Presbytery, and occupying what is presumed to have been up to that date an open space. The chapel was elaborately vaulted with the fan tracery of the period, and the lancets were, and still remain, walled up. Hence the somewhat unusual appearance of the east end of the Presbytery seen from the west.

Under these lancets, and facing towards the later chapel, was discovered a recess, partly filled with bones, and the back ornamented with crosses of various patterns, the central one being pierced the entire thickness of the wall. Its use has not been satisfactorily explained, but it seems to have been undoubtedly used at some period as a squint or hagioscope. Bishop Vaughan's Chapel and the ante-chapel eastward are the only portions of the church, east of the Presbytery, which are covered in. The side aisles flanking them, and likewise the Lady Chapel itself, are still in a semi-ruinous state,

St Davids Cathedral.
Encaustic Tiles in the Presbytery.

although within the past year or so the tracery in the windows has been restored. There are several fragments and monuments scattered about in different parts of this portion of the building, but all have suffered much from the weather. In the south aisle, built into the modern cross walls, are some old shields, apparently bosses, one charged with the arms of the See (see illustration). In the Chapel of St. Thomas of Canterbury (now the Chapter-house) is a case containing some fine specimens of pastoral staves and rings found during the restoration.

North of the nave are the ruins of St. Mary's College, with its tall tower and domestic buildings. West of the Cathedral is the magnificent ruined Palace of Bishop Gower,—a prelate who did so much, both to the fabric of the Cathedral, and to other buildings in this part of Wales,—Swansea Castle, church, and another episcopal palace at Lamphey, near Pembroke, besides other smaller works. The arcading, which is so characteristic of his work, is to be seen here in good preservation, and amongst other details is a beautiful rose window, or "marigold," at the end of the great hall.

The close wall which surrounded both the Cathedral and Palace, and other buildings connected with the fabric, remains in places, and a very curious two-storied octagonal building, attached to the eastern gate of the close, still remains, and is seen at the extreme left hand of the general view. It has been suggested that it formed a detached campanile during the period before the rebuilding of the central tower.

The plan which we give to-day has been taken from one kindly lent us by Mr. T. Taylor Scott, of Carlisle, to which we have made certain additions to bring the plan, which was made a few years ago, up to date.

ST. DAVID'S: THE CATHEDRAL AND PALACE.

This view, from a water-colour drawing by Mr. T. G. Jackson, A.R.A., has been taken from the rising ground on the northern side of the great courtyard of the Bishop's Palace erected by Bishop Gower. The portions of the Palace shown in the view comprise the entrance gateway (in the centre of the picture) and a portion of the main building which forms the east, or, more strictly speaking, the south-east, front of the Palace, connected at its southern end with the range of buildings formed by the Great Hall and the Chapel. Behind the ruins rises the central tower of the Cathedral, and on the extreme left the smaller tower of St. Mary's College.

Knowing that Mr. Jackson had been making a portfolio of sketches at and about St. David's recently, we begged him to add one of these to our more formal illustrations of the plan and architecture of the Cathedral, and owe him our best thanks for his ready compliance with our request.

EAST WINDOW, SKELTON-IN-CLEVELAND CHURCH, YORKSHIRE.

This window, the drawing of which was exhibited at the Royal Academy this year, was executed by Messrs. Shrigley & Hunt for the above-named church, near Saltburn-by-the-Sea. In the centre light, forming the keynote of the composition, is a figure of our Lord in Majesty, holding an open book as the revealed Word. The side lights contain two tiers of figures, the lower the four Evangelists, the exponents of the Word on earth, and in the upper tier the four Archangels, the superiors of the heavenly hierarchy. Below the figure of our Lord is a kneeling angel with a scroll inscribed, "Heaven and earth are full of the majesty of thy glory," and above the figure are two angels in adoration. In the five principal quatrefoils of the tracery are angels bearing shields, each charged with a letter of the sacred name. The window is exceedingly simple in its colouring, and silvery in tone throughout.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

(Continued from page 439.)

Mr. Hill: What would be the level of the top water of the reservoirs as compared with the level of the water in the river at about the quantity that you would be taking?—The water in the river above Bell Weir Lock is 50 ft. above datum.

Mr. Mansergh: At summer level?—At summer level it is 50 ft.; 30 ft. higher in A.

The top water in A would be 80 ft. above Ordnance datum?—Yes.

Mr. Hill: And about 34 ft. above the land?—About 30 ft. above the land.

Thirty feet above the land?—Yes; like a railway bank it would look. That region is particularly well adapted for waterworks. There is an immense area, all the way up there for miles, of gravel beds full of water, and there is a beautiful sand for filtering. In the future,—I am talking of the remote future,—that would be a very good place for an extension, because at Hampton we are very much crowded up. We cannot extend at Hampton; but out there you can extend in any direction.

You do not propose to deal with the river in any way in consequence of the abstraction of the water?—Not at all; we should leave that.

With reference to those parties who are on the banks of the river, what would they say to this abstraction? Would there be any objection raised by them?—They would never have any greater abstraction than they now have, nor yet so much, because we have provided for the minimum flow of 200,000,000 gallons a day over Teddington Weir.

Mr. Mansergh: Where did you put the 200 000,000 gallons into the river?—We do not take them out; we let them alone; we take the surplus and put it into the reservoirs.

Leaving always the 200,000,000 gallons?—

Yes, I imagine that if it were carried out there would be a weir at that point, and if the water was below that it would not flow over. It would be automatic.

You do not show any filters in connexion with these reservoirs?—None at all.

You propose at present to filter that quantity down at your works?—Down at the present filters.

But if filters were necessary as the demand increases you say this is a favourable place?—A very favourable place.

Where the reservoirs are constructed would be a favourable place for the construction of filter beds?—Yes, because there is land and material.

Then you would get about 8 ft. to 10 ft. of water running into the reservoirs by gravitation?—Thereabouts.

And pump the 30 ft.?—Yes.

Now, you have got down as the estimate for reservoir A, 899,000*l.*?—That includes a conduit,—one line of conduit right down to Hampton.

What size would you make that conduit?—10 ft.

Sufficient to take how much water?—Two of them will take the whole 300,000,000 gallons a day.

You make that at first?—Make one first and the second after. It would be convenient to make it in the clay and line it with iron as they make those electric railways.

I understand now what seemed an anomaly in these estimates, where you have got the 899,000*l.*; that includes the cost of the reservoir and one conduit?—Yes.

Then your second 2,000,000,000 gallons, reservoir B, you estimate at 363,000*l.*, which comes to 182*l.* per million?—Yes.

Then the next 2,000,000,000 gallons comes to 368*l.* a million; but that includes another conduit, I take it?—Another line of conduit.

Then you really estimate that those reservoirs can be constructed for about 180*l.* per million gallons?—It is thereabouts.

There is one thing I cannot understand in the next item, "annual pumping charges on 256,000,000 gallons per day based upon present cost to waterworks companies of 2·50*l.* per million gallons?"—I think that is Mr. Hunter's estimate, capitalising the pumping into the reservoirs.

But it is an annual pumping charge of 2·50*l.* per million gallons; there must be something wrong about that?—That is taken from Lass's "Tables."

The lift will not be more than 35?—Not more than 30.

With friction?—Yes.

Later on, when you go into further details, somewhere towards the end, the cost of pumping is put down at 5*s.* per million gallons?—That, I think, is the future pumping into the district.

Mr. Hunter: That is the pumping in the future. The 2·50*l.* is the cost from Lass's Tables of the whole pumping into the whole of the districts of the companies, at a height, perhaps, of 300 ft. on an average, or it may be as much as that altogether. You see this is only 15 head of water, and I take it at 5*s.* as being a fair comparative cost.

Mr. Mansergh: The 2·50*l.*, of course, is the cost of pumping up to your high lifts in London.

Mr. Hunter: Yes, this is taken at 5*s.*, which is a great deal more in proportion, but that sum is put down as something which would be fair and reasonable.

Sir A. Geikie: May I ask if this is a scheme which would not be undertaken by your company alone, or a general scheme by all the companies?—It would be a general scheme if ever carried out, certainly.

Do you appear here having had a consultation with the other companies? Yes, I do. It was prepared by us, and the Chairmen of all the companies authorised its being laid before the Commission.

Mr. Mansergh: The water in these reservoirs would be taken in an intermediate stage?—Yes, after the first flood is by, we should take the rest, which is very good.

So that what you pump into the reservoirs could not interfere prejudicially with the interests of the riparian owners between Staines and Hampton?—Not at all.

Mr. Hunter: Will you allow me just to add one thing? It is my strong opinion that, in the interests of the consumer, it is desirable and necessary that the Thames and Lea should be utilised to the utmost extent before recourse is had to any other watershed. I want to emphasise that.

Sir A. Geikie: I understand from your evidence that you think the Lea watershed much more used than the Thames is?

Mr. Hunter: Exactly.

Mr. G. F. Deacon, C.E., gave detailed evidence against the nine reservoirs that had been proposed by Messrs. Marten and Rofe, and also on rainfalls and discharges; Mr. A. R. Binnie on the flow of the Thames; Dr. T. O. Dudfield (Medical Officer of Health for Kensington) on the water supplied to his district; and Dr. Percy Frankland put in additional statements relating to bacteriological researches, on which subject Dr. Klein and Professor Ray Lankester also gave evidence.

The Commission stands adjourned to the middle of December.

THE LONDON COUNTY COUNCIL.

A SPECIAL meeting of this Council was held on Friday, the 25th ult.

The Woolwich Ferry.—The Bridges Committee brought up a report recommending the acceptance of the tender of Messrs. R. & H. Green for a ferry-boat for 17,325*l.* Messrs. Green's tender was not the lowest, the following being lower than that proposed for acceptance: Messrs. W. Simons & Co., 15,800*l.*, and Messrs. W. Allsup & Son, 15,900*l.*

The Hon. R. Grosvenor, the Chairman of the Committee, in introducing the report, said that the difference in the price showed the difference in the trade union rate of wages in Glasgow and London.

Mr. Torrance moved, as an amendment, that the recommendation be referred back to the Committee, with an instruction that the tender of Messrs. Simons & Co. be accepted, provided that the usual inquiries result in showing that their position and standing are satisfactory. He said that the proposition of the Committee was the most audacious ever submitted to the Council. There was a great principle at issue. How could they expect country contractors to come forward if this was the system to be adopted? It was a most unfair and ungenerous proposal. They talked about Free Trade, but this was a plain proof that the spirit of Protection was rampant in the Council.

Mr. J. G. Weir, M.P., seconded the amendment, and said it was a gross injustice to the ratepayers to be asked to pay 1,500*l.* more than they needed to do. It was only within the last few days,—since a deputation of the unemployed had waited upon the Council,—that the proposition was brought forward. If the Council intended all its work to be done in London, they had better tell country contractors so.

Mr. Alderman Arnold said the interests of the Council and its duties were wider than London. They had invited tenders from every part of the kingdom, and he hoped they would never regard London as an isolated town, but as the centre of the empire.

On a division, 64 voted for the amendment and 23 against. The tender of Messrs. Simons, of Glasgow, was, therefore, accepted.

The usual weekly meeting of this Council was held on Tuesday afternoon last, the Chairman, Mr. John Hutton, presiding.

Tenders.—Tenders were received for the formation of new roads, airing courts, &c., at the Claybury Asylum (The list appears in another column of this issue of the *Builder*).

The Albert Palace, Battersea.—The General Purposes Committee recommended that, subject to the Albert Palace, together with the grounds attached thereto, being handed over to the Council free of expense and in good repair, the Council should apply to Parliament in the next Session for power to accept the gift, and to manage and maintain the palace and grounds as a place of recreation for the public. The Architect reported that the cost of maintenance, as part of Battersea Park, would be 4,700*l.*

Mr. Fardell urged that the Council should have more information as to the responsibility entailed, and as to the uses to which the building was to be put.

Mr. Benn, M.P., said the maintenance of the structure, both internally and externally, represented 1,200*l.*; attendants, watchmen, and firemen represented about 2,500*l.*; gas, insurance, &c., 1,000*l.*—making 4,700*l.* a year. The understanding was that the building should be handed over to the Council as a freehold, with the structure and the organ in good order.

The recommendation of the Committee was verbally amended so as to make clear that the Palace and grounds were freehold, and acquired by the Council free of expense and in good repair.

Mr. Beachcroft moved to add that power be given to the Council to make, from time to time, such reasonable charges for admission as they thought fit.

Mr. Robinson seconded the amendment, which was carried by a large majority.

After further discussion and verbal amendment, the Committee's recommendation was carried, not without protest by some members that the proposed gift would prove to be "a white elephant."

Proposed Taxation of Ground Values.—The Local Government and Taxation Committee presented a report on this subject. The first resolution they proposed was

"That it is imperative that the relief of the occupying ratepayers of London from the increase of charge should be secured in the next Session by the provision of some new source of revenue, such as, by way of illustration, a municipal death duty, rent duty, or special rate on ground values."

Mr. Costelloe, the Chairman of the Committee, in moving the adoption of the resolution, said he thought they would be all agreed that some new source of revenue was necessary, and they desired to put the taxation where it would lie and where it would remain. The unearned increment of rent in London year by year represented a capital value of 4,000,000*l.* to 5,000,000*l.*, and possibly more. That, of course, was not the annual income, but the capital value. Ground values might be defined as all forms of wealth produced for the owners of land by the constant increase in the value of property, due to the industry of the community, and to the increase of which the owner or leaseholder had himself contributed nothing.

Mr. Stuart, M.P., moved, as an amendment:—

"That it is imperative that the relief of the occupying ratepayers of London from the increase of charge should be secured in the next Session by the provision of some new source of revenue; that in the opinion of the Council the most equitable method of securing this relief is by the taxation of the ground values of London; and that it is urgent and necessary to take immediate action to that end in the next Session of Parliament, and, subject to the ultimate settlement of this question, some immediate relief might be obtained by an interim special rate on ground values, rent duty, or municipal death duty."

He said that the time for action had now come, and he pressed his amendment as a practical proposal.

Mr. Charles Harrison, Vice-Chairman of the Council, seconded the amendment. He said that ground values did not at present contribute to taxation, and because that was so ground values were a new source of taxation and a new kind of property to be taxed.

The amendment was, on a division, carried by 66 votes to 21, and, it being then 7 o'clock, the debate was adjourned to a special meeting to be summoned for Thursday, December 1, at the moment when we go to press with this number.

BUILDERS' BENEVOLENT INSTITUTION:

ELECTION OF A PENSIONER.

AN election of one male pensioner on the funds of this Institution was held at the offices, 35, Southampton-row, Bloomsbury-square, on Thursday, the 24th ult., Mr. George Plucknett, J.P. (Treasurer), in the chair. There were two male candidates for the vacancy, besides three female applicants who received votes.

Shortly after the close of the poll, the scrutineers (Messrs. Thomas Stirling and T. F. Rider) announced the result of the polling to be as follows:—Joseph Lestock Mould, aged seventy, of 60, Muriel-street, Islington, builder (second application), 697 votes; John George Bishop, aged sixty-five, of 21, Spencer-square, Ramsgate, builder (first application), 2,272 votes, including 250 votes in respect of his subscriptions to the Institution. The successful candidate was, therefore, declared to be John George Bishop. The votes given to the female applicants were as follow:—Sarah Elizabeth Drake, aged sixty, Tylers' and Bricklayers' Almshouses, King Henry's Walk, Ball's Pond, widow of Francis Drake, late of Acton, builder (fourth application), 2,383 votes; Susanna Mansell, aged sixty-eight, of 20, Bridge-road, Hammersmith, widow of William Mansell, late of Hammersmith, builder (third application), 2,484 votes; and Mary Ann Healing, aged sixty-two, of Curtain-road, Shoreditch, widow of Samuel Thomas Healing, late of Spitalfields, builder (second application), 189 votes.

Among the friends of the Institution (other than those already named) who took part in the proceedings were Messrs. G. J. Lough, W. J. Mitchell, G. N. Watts, J. W. Scrivener, G. B. New, R. Richardson, C. Bussell, and J. T. Bolding.

Votes of thanks to the Chairman and scrutineers closed the proceedings.

Correspondence.

To the Editor of THE BUILDER.

"ARCHITECTURE A PROFESSION OR AN ART."

SIR,—Although I ought to have written "from time beyond living memory," instead of "from time immemorial" [p. 400, *ante*], surely Mr. Jackson is a little hypercritical in speaking of his examination being *in* literature and not *for* literature. The Institute examination is one *in* (the art of) architecture *for* a specific purpose. So also is that in the dead languages an examination *in* literature *for* another specific purpose. It may not have to do with Mr. Jackson's argument, but it has with mine. For, as a man may be taught and trained and examined *in* literature, so he may be taught and trained and examined, as I pointed out, *in* architecture; and this is the preliminary fact which is denied altogether by Mr. Jackson and his allies.

What use may be made eventually of the examination is quite another matter. But the passing of the examination is the first step towards fitting a man for his subsequent work in life. He may not become, more than in name, an architect, a poet, or an author. This must depend upon his own personal capabilities. Again, the incidental fact of the exercise of (the art of) architecture being strictly limited by certain legal restrictions of structural and sanitary security, is no more than the incidental fact of the exercise of literature being equally circumscribed by the legal bounds of morality and decency. And the question whether architecture shall be or shall not be made a close profession does not affect in the least degree the exercise of the "Art," or the main issue of the possibilities of such an examination on the one hand, or of the futility of it on the other.

WILLIAM WHITE, F.S.A.

THE INSTITUTE AND ARCHITECTURE.

SIR,—In a work recently published, "Architecture a Profession or an Art," I find that an address to the Royal Institute of British Architects which I signed is placed at the head as a sort of text for an attack on the Institute.

When I signed this document a serious attempt was being made to obtain legislation for what is termed "closing the profession." The Institute was petitioning the House of Commons against it, and it is a step to which I see very great objection. I signed in all good faith with the Institute, and I think that I might have been consulted before my name was used so as to appear hostile to it.

With regard to the Institute Examinations, I feel sure that the healthy stimulus they give to exertion and study is very decidedly advantageous. Before they existed, no means were available by which to ascertain whether an applicant for admission had any real qualification for his work. Surely it is a step in the right direction to encourage men to study and show that they have done so to some effect?

I should be glad to see another step taken by which the Institute would become a teaching body. For the present it has taken the line of assisting the ever-vigorous Association in the work of education, and perhaps they will work together on broader lines than if they work singly.

There seems to be no reason why the Institute should not assist in the education of designers and artificers of all classes connected with architecture, and become (as advocated in the book alluded to) an Institute of Architecture; but that happy time will be more speedily brought about if those who desire it use their influence to promote it, instead of holding aloof with the apparent object of driving the Institute into narrow ways.

W. M. FAWCETT.

THE TREATMENT OF ANCIENT WALL-PAINTINGS.

SIR,—I am often asked what is the best way of treating the remains of ancient wall-paintings, and should therefore like to inquire of Mr. Newman* the nature and properties of the preservative solution which has been applied to the Harbledown and other paintings.

After the sad fate of much delicate work at Westminster and elsewhere from the use of "preservative solutions," it would be reassuring to those of us who value old work to know that wall-paintings can be really preserved by such means.

W. H. ST. JOHN HOPE.

* See letter, page 401 *ante*.

THE OLD TEMPLE.

SIR,—In the historical note on "Stone Buildings, Lincoln's Inn" (p. 392, *ante*), it is stated that "next east" of the site of the Black Friars' first London settlement was "the inn of the Bishops of Lincoln *near* the Old Temple." This needs a little explanation. The residence of the Bishops of Lincoln and the Old Temple were really identical. The first dwelling-place of the Knights Templars in London, where they established themselves in 1118 A.D., was on the south side of Holborn, beyond the bars. On their removal to the site long inseparably associated with their name between Fleet-street and the Thames, this "Old Temple" was purchased by Robert de Chesney (de Querceto) Bishop of Lincoln,—singularly called by Stow, "Robert de Curars,—about four years before his death (which occurred in 1166) as a London residence for himself and his successors in the See. This it continued to be till the spoliation of Edward VI.'s reign, when it was granted to Wriothesley, Earl of Southampton, whose name still survives in Southampton-buildings. The sum Bishop Robert gave the Templars for the property was 100 marks, and he had to pay three gold pieces annually to them "pro omni servicio." The charter of Henry II., confirming the sale, is given in Dugdale (vol. vi., p. 1295, No. liv.); it runs "Sciatis me concessesisse, &c., &c., Ecclesiæ Beatæ Mariæ Linc. et Roberto episcopo ejusdem ecclesiæ domos quæ fuerunt fratrum Templi Lundoniis in parochia S. Andreæ de Holeburne cum capella et gardinis et omnibus, &c., quas idem Robertus emit C. marcis de fratribus Templi." In the "Magna Vita" of Hugh of Avalon, Bishop Robert's sainted successor in the See, we find the "Old Temple" as the "inn" of the Bishops of Lincoln: "proprium diversorium quod secus Lundonias apud vetus Templum possidebat" (p. 331). This was the scene of Hugh's last illness and death, November 17, 1200; and in the Templars' former church, "ecclesia beatæ Mariæ apud Vetus Templum," his "viscera" were buried prior to the transportation of his body to Lincoln. His biographer, in his report of a miraculous vision seen by him the night before Hugh's death, gives some curious particulars of the dwelling, such as only one familiar with the place could supply. He tells us of a "pleasaunce,"—"viridarium,"—shut in by the buildings of the "hospitium," on the north and west, *i.e.*, towards Holborn and the present Chancery-lane,—a thoroughfare not then in being, even under its older name of New-street. On the east and south there was a ditch overgrown with brushwood and briars. A tall pear-tree stood against the wall of the house just against the spot where the head of the bishop's bed stood; altogether a very different picture than that which Holborn and Chancery-lane now present.

From the passages quoted it is abundantly evident that the old Temple and the Bishop of Lincoln's Inn,—quite a distinct place from what we know as Lincoln's Inn, which took its name from Henry Lacy, Earl of Lincoln,—was one and the same. Stow distinguished them in the later edition of his "Survey,"—"adjoining to this Old Temple was sometime the Bishop of Lincolne's Inn," but in the first edition he stated the fact correctly: "The Old Temple, the same was after the Bishop of Lincolne's Inn." The mistake of the old topographer has naturally been perpetuated and accepted. We are to look for the site of this historic mansion, according to Mr. Wheatley ("London Past and Present," iii., pp. 281-2), at No. 322, Holborn, and the former "Blue Posts" tavern, No. 47, Southampton Buildings. In 1847 what was still called "the chapel" was standing on the Holborn site with rubble walls and a flat-timbered ceiling, and Mr. Peter Cunningham was told by the then occupier, Mr. Griffiths, that when making some alterations on the premises he had come upon portions of a circular building, evidently a fragment of the Templars' first church. This church, the "capella" granted by Henry II., to Bishop Chesney, is described by Stow, who appears to have seen what remained of it nearly three centuries ago, as "round in form, as the new Temple by Temple Bar and other Temples in England." It would be interesting to know whether any traces of the Old Temple still exist on the above-named sites.

EDMUND VENABLES.

THE LAW OF LIGHT.

SIR,—In last week's number you refer to a recent decision on the law of light, and suggest the action of the Institute with reference to the amendment of the existing laws on the subject. Allow me to draw your attention to the enclosed extract from the "Proceedings," issued January 7 last, containing a report to the Council from the Science Committee, recommending that an Act of Parliament should be promoted for the purpose, and the text thereof. We have as yet been unable to get the Council to take any definite action in the matter, but hope your remarks may exercise some influence.

WILLIAM C. STREET.

A COAL FIRE—WHAT COAL?

SIR,—Your correspondent, in last week's issue, pleads for the cheerfulness of the coal fire. Allow me to tell him that he can obtain all the warmth and glow that he requires from an anthracite fire, without smoke, smell, or dirt. The Smoke Abatement Exhibition of 1882 proved a failure, chiefly because its outcome consisted of certain compulsory grates and other structural provisions. Considering that anthracite is burnt so largely in America, it is a source of wonder to me that this unique coal, which is found in our own country, should have been so long neglected.

R. S. R.

*** But what is the extent of the supply of anthracite in comparison with bituminous coal, and how will its cost be affected if every one wants it?—ED.

The Student's Column.

CONCRETE.—XXIII.

FOUNDATIONS (*Continued*).

SOMETIMES the whole site of a building is covered with concrete. The least allowable thickness is 9 in., if the brick footings of the walls are to be built directly upon the concrete; but a thickness of 12 in. is more usual, even for the smallest buildings, and a thickness of 18 in. and upwards is adopted for larger structures, according to the weight of the building and the nature of the ground.

Frequently, however, an additional thickness of concrete is put under the walls. Sometimes the concrete under the walls is kept quite independent of the concrete layer which is spread over the site, the layer in this case being usually only 6 in. thick, and the top of it finishing level with the top of the concrete foundation or with the top of the brick footings, if the appearance of these in the basement would be objectionable; such a layer is really not part of the foundation.

The application of concrete to foundations is not, however, confined to simple slabs. In rocky ground, concrete may be used in the form of an arch or lintel to span a soft dyke, abutting at each end on the solid rock, which may be splayed or benched to receive it, as in figure 6. The thickness of the concrete must

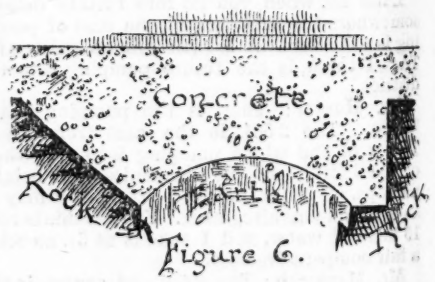


Figure 6.

be regulated by the weight the arch has to carry; the strength of concrete arches will be considered hereafter. The earth under the concrete can be brought to an arched form and rammed, so that no boards or centres will be required.

Sometimes it will prove economical to erect concrete piers, and to form concrete arches or arched lintels over them, instead of forming a continuous concrete foundation. The ground under the piers should be very firm, or disaster may follow. On steep ground the system of piers and arches is often advantageous. Figures 7 and 8 show the method adopted (1882-4) in the foundations of the east wing of the Army Headquarters at Simla, India.* The ordinary foundations in these buildings consisted of a series of concrete piers to carry iron columns, and with cross-footings between to carry the cross walls, but where the excavation, in order to get a good bottom, was carried more than 10 ft. deep, "groined arches" were thrown from pier to pier to carry the cross walls. The concrete for the whole of the buildings consisted of *hydraulic lime*, ground on the building-site and used quite fresh and

* See paper by Mr. Walter Smith, A.M.Inst. C.E., in the "Proc. Inst. C.E.," vol. lxxxiii. (1885-6), part 1.

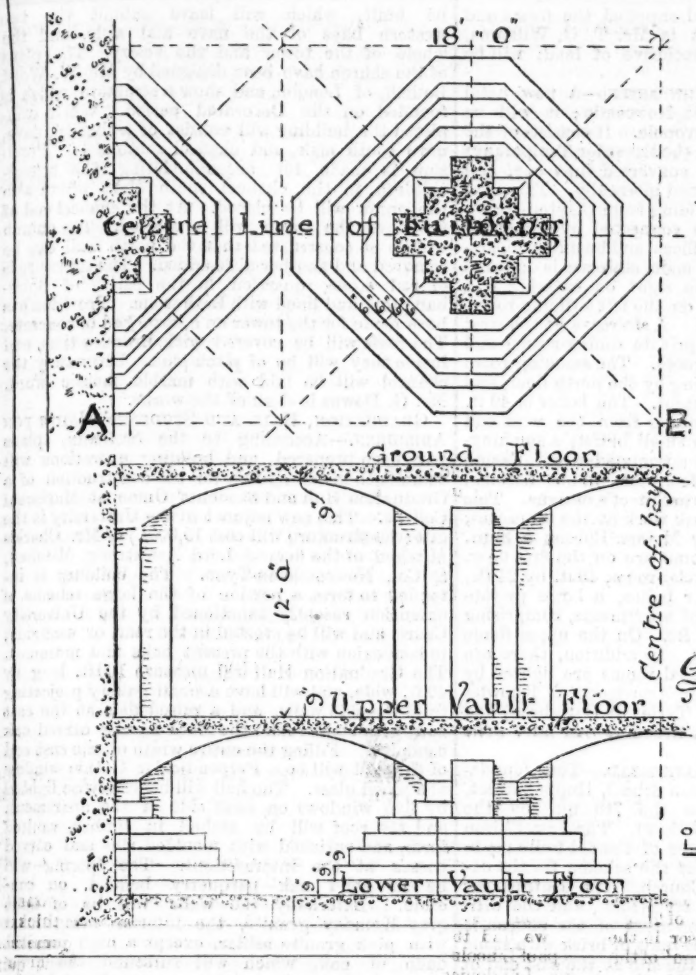


Figure 7. Plan.

Figure 8. Section on Line AB.

without slaking or wet-grinding; *surkhi* (pounded bricks), ground on the site and screened through a sieve of 132 meshes to the inch (superficial) for fine work, and through ¼-in. and $\frac{3}{16}$-in. bar screens for ordinary work; and *limestone*, broken by hand to pass a 1-in. ring. The lime and surkhi were mixed dry in the proportion of 1 to 2; 5 cubic feet of ground lime + 10 cubic feet of surkhi, mixed dry, made 14 cubic feet of "dry mortar." This was mixed with the aggregate in the proportion of 42 to 100 for ordinary foundations, and 45 to 100 for walls and arched vaulting. For ordinary foundations, therefore, the concrete consisted of 1 part lime, 2 parts surkhi, and 6·6 parts broken stone, a rather poorer concrete than would be allowed by the London County Council. The following table shows the material used to make 100 cubic feet of rammed concrete of each kind:—

TABLE XXV.

Bulk of Ingredients in Lime Concrete.

	Ordinary Foundations. cub. ft.		Walls and Arched Vaulting. cub. ft.
Lime	17·5	.....	19
Surkhi	35	.....	38
Dry Mortar	49	.....	53
Stone Ballast	117	.....	117
Rammed Concrete.	100	.....	100

The concrete in the foundations was deposited in 3-in. layers, and "rammed until the moisture exuded at the top, and the blows of the rammer caused no further yielding in the mass." Stones and boulders were imbedded in the concrete, and in this way a saving of about 6 per cent. was effected. The outline of each foundation was marked by rough stone walling lined with planks, and as each course was completed and sufficiently set (usually in three days), the planks were removed and the space between the piers was filled with earth well rammed. Successive courses were laid in this manner until the springing of the arches was reached. Then earth was heaped up, well rammed, moulded by templates to the shape required for the groining, and plastered first with cow-dung and afterwards with lime-plaster. Concrete was then deposited and rammed up to the floor-level, "each vaulted arch being completed to its full thickness before the next was commenced. At a later period the earth-centres were removed, when the groins were found to be clearly defined."

When concrete is laid on piles, it is customary to cut the tops of the piles to one level and to excavate between them to a depth of 1 ft. or more; the concrete is then deposited between the piles and well rammed, successive layers being added above the heads of the piles until the requisite thickness has been attained.

In America, where buildings of extravagant height are often erected, great attention is of necessity bestowed upon the foundations. In the case of the offices of the *New York Tribune*, a building measuring 150 ft. high from the footpath to the eaves, the substructure consisted of a bed of concrete the top of which was 25 ft. below the footpath. The concrete rested on a good bed of firm red beach sand, and was composed of 1 part Portland cement, 3 parts sand, 4 parts clean white gravel, and 5 parts broken stone, mixed wet and well rammed in 6-in. layers to a total thickness of 18 in. This mixture (1 to 12) was found strong enough, but it must be confessed that little or no transverse stress was applied to it, for immediately over it was laid a course of immense granite slabs 9 ft. wide and 16 in. thick, and on this the foundation-walls, 6 ft. 8 in. thick, were built of fire-brick laid in Portland cement, with granite bond-stones 10 in. in thickness at intervals of 3 ft. up to the level of the basement floor.

In Chicago the practice of bedding steel rails in concrete for foundations has been recently adopted. It appears from Mr. A. Arthur Cox's report* that in that city "the subsoil is composed of a black loamy clay, which, on the surface, is tolerably firm, but a few feet below, and in some parts to a depth of 12 ft. to 15 ft., is quite unfavourable to building operations." Where cellars are required the footings must be as shallow as possible, so as not to get into or near the soft substratum. Fig. 9 shows the foundation of one-half of a pier in the "Rookery" Office Building, Chicago. This building is eleven stories high, each story measuring about 12 ft. A layer of concrete 18 in. thick is first deposited, and on it are laid four courses of steel rails 4½ in. deep, the first transversely and the next longitudinally, and so on; these are "spaced evenly at small intervals," the spaces being thoroughly filled with cement concrete. On the top of the rails is laid a course of hard stone 6 in. thick; above this the pier is built of brick. The total thickness of the foundations is only 3 ft. 6 in., while the thickness up to the top of the uppermost set-off is only 2 ft. 7½ in.

Grouting.—Where a building has to be erected on a bed of good, clean gravel, concrete may be unnecessary, as the gravel can be consolidated where required by grouting with thick, neat cement grout. Thin grout does not set well, and grout containing sand is liable to give great inequality of strength, as the sand and cement easily separate, and one part of the grout may be nearly all sand, while another is nearly all cement.

Concrete in Water.—We do not propose to describe the various kinds of concrete foundations used in works in the sea, such as the large-block system or the bag system; but a word or two about concrete caissons or wells may prove useful. These have been used on many occasions, both for works in the sea and for works on marshy ground. They consist of a rim or cutting edge, frequently of wood and iron, on which is raised a concrete wall either in the form of a circle or a rectangle; the rectangular form is more easily built, but the circular form, although more difficult to construct on account of the shaped frames which are required, ought to be adopted, as such caissons can be sunk more regularly and are less liable to crack in sinking. In large caissons of rectangular shape, iron tie-bars are sometimes imbedded in the sides to prevent cracks. The height of the first portion of the caisson may be about 5 ft. This is placed in position, and is sunk by men digging inside, or, when the water becomes too strong, by excavating with chain-grabs or other contrivance. When the sinking has been continued far enough, another height of concrete is added to the caisson, and so on until a proper foundation has been reached. At Colombo Harbour, Ceylon,* the depôt-wharf wall is founded on a double row of concrete cylinders, each section being 5 ft. in external diameter and 3 ft. 6 in. deep, the concrete being 12 in. thick. Another part of the wall is founded on cylinders 7 ft. in external diameter, the concrete being 15 in. thick; these cylinders were formed in sections 4 ft. 10 in. deep. The concrete in the lowest or cutting ring of each caisson was composed of 1 part Portland cement to 3 parts stone and sand; the concrete in the remaining sections was of 1 part cement, 2 parts sand, and 3 parts stone.

At Felixstowe tidal-basin† rectangular concrete caissons, 30 ft. by 20 ft., were used with walls 5 ft. thick, built on a curb of wood and iron sloped down from the inside at an angle of 45 deg. to an outer cutting-edge of cast-iron. As the sinking proceeded, concrete was added in layers 3 ft. 3 in. high, until the caissons had reached a proper depth; 6 to 1 concrete was then filled into the caissons to a height of 7 ft., and 10 to 1 concrete for the remaining height.

The proportions of the ingredients in concrete used for works in the sea vary according to

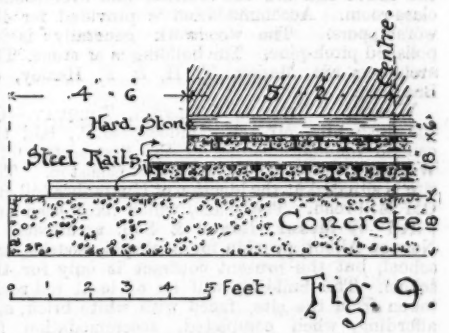


Fig. 9.

the purpose for which it is required. In sheltered places and in the hearting of walls 12 to 1 concrete is often used, while in exposed places and for face-work 4 to 1 or 6 to 1 must be used.

THE ENGLISH IRON TRADE.—Quietness continues to prevail in the crude-iron branch, and prices, although exhibiting little change, have a downward tendency. The inquiry for tin-plates has somewhat lulled. In manufactured iron little is doing, and quotations are depressed. In the steel department few signs of activity are observable. Shipbuilding orders are more plentiful; but the price at which they have been secured leaves little margin for profit. Engineers are quiet. The coal trade is also slacker.—*Iron.*

* See "A Tour in the United States," by A. Arthur Cox, holder of the Godwin Bursary. "Transactions of the R.I.B.A." 1891.

* "Proc. Inst. C.E." Paper by Mr. John Kyle, vol. lxxxvii. (1886-7), Part I.

† Mr. John Russell, in discussion on Mr. Kyle's Paper.

OBITUARY.

Mr. Hugh Barclay.—The death of Mr. Hugh Barclay, senior member of the firm of Messrs. H. & D. Barclay, architects, Glasgow, took place on the 25th ult. According to the *Glasgow Herald* he was sixty-four years of age. Mr. Barclay was a member of the Glasgow Institute of Architects, and acted on the Council of that body for a number of years. He was the architect of the Greenock Municipal Buildings, the Glasgow Academy, and several schools in Glasgow and Govan.

GENERAL BUILDING NEWS.

Ward's City of London School for Girls.—The foundation stone of Ward's City of London School for Girls, to be erected on the Victoria Embankment, on land at the rear of the Guildhall School of Music, was laid on Wednesday last by Mr. J. Barrett, the chairman of the Law and City Courts Committee, which has charge of the construction. The architect is Mr. Andrew Murray, the City Surveyor, and the design is in the Italian style. The building will be faced with Portland stone, and will accommodate about 400 scholars. On the ground-floor will be the Lady Principal's room, and an office for the Secretary, the former of which will be so arranged as to serve for a library and a committee-room. In all there will be sixteen class-rooms, a luncheon-room on the top floor, 53 ft. by 27 ft., for 240 pupils; the housekeeper's apartments will be in the attics. In the basement will be the cloak-rooms and lavatories, and also a recreation-room of 951 ft. super.; this will be lighted by a skylight. Boyd's ventilating stoves will be used for warming the class-rooms; the basement will be floored with asphalte, the class-rooms with solid wood blocks upon concrete, and the treads of the stairs will be of teak. The contractors are Messrs. Atherton & Latta.

Restoration of Mawdesley Church, near Ormskirk.—This church, which has just been restored, was opened recently by Bishop Cramer-Roberts. The accommodation provided having for some time been found to be very inconvenient in its arrangement, it was decided to rearrange the interior throughout, and to effect other improvements. New benches were provided throughout of pitch-pine, and arranged with central and side aisles. A gallery has been provided at the west end, with convenient staircase, while new screens have also been erected. The entrance has been entirely rearranged. The old flat ceiling has been removed, and the roof left open, being finished in plaster of cream colour, and having the timbers visible. The whole of the work has been carried out by Messrs. Moore Bros., of Rawtenstall, from the designs and under the superintendence of Mr. R. Knill Freeman, of Bolton.

Baptist Chapel, Rawdon, Yorkshire.—On the 16th ult. a new Baptist Chapel was opened at Rawdon, Yorkshire. The plan of the new building consists of a room measuring 78 ft. by 37 ft., and 27 ft. in height. There are two shallow transepts, which can be extended when further accommodation is required. At the north end are the vestibules, and over them the gallery, three seats deep. At the opposite end of the chapel is a recess containing the organ, and seats for the choir. In front of the latter is the pulpit, whilst immediately under this is the raised daïs and the large baptistery. At the south end are the vestries, and over them a class-room. Accommodation is provided for 436 worshippers. The woodwork generally is of polished pitch-pine. The building is of stone. The architects are Messrs. T. H. & F. Healey, of Bradford.

Wesleyan Chapel, Chelston, Torquay.—On the 16th ult. Mr. R. Mallock, M.P., laid the central foundation-stone of the first section of a Wesleyan chapel to be erected at Chelston. The site is situated at the junction of Huxtable's-hill and Old Mill-road. The plans, which have been prepared by Messrs. Rowell & Son, architects, of Newton Abbot, provide for a chapel, vestries, and school, but the present contract is only for the school. The building will be of local red rock, taken from the site, faced with white brick, and affording, when completed, accommodation for about 400 persons. The school will accommodate 150 persons. The first section, for which Mr. S. Blackford, of Upton, is the contractor, will be about 550*l*.

Presbyterian Church and Schools, Mold.—The Presbyterian Church and Schools just completed here are erected on a site near the Railway-station, and are approached by a flight of steps leading to tiled vestibules and porches. The style is Gothic, and the building will seat over 450 persons. The front portion is semi-circular on plan, and the sittings are arranged in a gallery form, with stepped aisles leading to the body sittings. The school buildings are at the rear, and contain on the ground a school-room to accommodate 200 persons, three class-rooms, minister's vestry, and conveniences, with a larger school-room. The contractor is Mr. Thomas Roberts, of Mold; the clerk of works, Mr. John Roberts, of Ruthin. The heating arrangements were carried out by Messrs. Saunders, of Manchester; and Lackland & Co., of Birkenhead, supplied the glass. Messrs. Pearson & Brown, of Manchester, executed and supplied the forms and pewings. The architect is Mr. T. G. Williams, Liverpool. The cost, exclusive of land, will be about 2,200*l*.

A New Hotel at Newcastle.—A new hotel has just been opened at Newcastle; it will be known as the Hotel Métropole. It consists of the Old Alexandra Hotel and the Excelsior Temperance Hotel in Clayton-street, converted into one, and much altered and renovated internally. There are two entrances to the building from Clayton-street, and these entrances are connected by a corridor passing in front of the offices and business department of the hotel. The main staircase is opposite the south door. On the right on entering is a private dining-room, and on the left a dining-room, 40 ft. long by 24 ft. wide. A staircase at the west end leads into a small private dining-room; and under this is the serving-room. The smoking-room is on the left upon entering by the north door, and the billiard-room on the right. The latter is 40 ft. long by 22 ft. wide. Opening from the west end of the billiard-room are a small buffet, a smoking-room, and ample lavatory accommodation. Facing the entrance is the buffet, with walnut fittings, executed according to the architect's designs. This work, together with the oak work at the entrances, has been carried out by Messrs. Robson & Sons. The remaining public rooms are on the first floor. They consist of a commercial-room, 40 ft. by 24 ft., a private dining-room for ladies, a large private dining-room and suites of apartments, comprising bedrooms, sitting-rooms, &c. On the upper floors there are sixty bedrooms. In addition, there are stock-rooms. The principal rooms are lighted by electricity. Messrs. Lamb, Armstrong, & Knowles were the architects. Mr. Tyrie, of Gateshead, had the contract, and Messrs. Green & Son have done the decorative work.

School Buildings, Gateshead.—The foundation-stone of the new Ellison School, Hopper-street, Gateshead, was laid on the 7th ult. by the Mayoress (Mrs. Walter Willson). The new Ellison School is to take the place of the old building in High-street, and is part of the scheme for the extension of Holy Trinity Church. The contract for the school has been let for 1,150*l*., and the estimated cost of the enlargement of the church is 3,000*l*. The school will be built of brick with stone dressings. It will be on the site at the east end of the church, and will be a one-story building. The architect is Mr. Stephen Piper, Newcastle, and the contractors are Messrs. Anderson & Slater, Newcastle.

Lunatic Asylum, Glasgow.—On the 8th ult. the memorial-stone was laid of the new asylum which is at present being erected at Gartloch, about six miles north-east of Glasgow, by the City of Glasgow District Lunacy Board. The asylum is being erected for the accommodation of the city lunatic poor in connexion with the Glasgow District Lunacy Board and the City Parochial Board. The buildings are arranged on the pavilion system, and are divided into two distinct parts,—asylum and hospital. The asylum comprises four blocks, the male and female patient accommodation being separate, and each block is connected with the central or administrative department by covered ways. The administrative department consists of a large dining-hall, kitchen, sculleries, general stores; and over the dining-hall is placed a recreation-hall. The official block is situated to the north, and is flanked by two towers rising to the height of about 130 ft. In this is the board-room, doctor's room, waiting-rooms, &c., on the ground floor, and on the upper floors sleeping accommodation for attendants. Each block is divided into two wards, with dormitories above, and is equipped with boot-rooms and lavatory accommodation, and large bath-rooms entering from the corridors. Workshops are situated on the male side, and on the female side a laundry is placed. The hospital block has accommodation for five classes of patients,—wards for observation, for the old and infirm, for acute and noisy, for sick and invalid, and for infectious cases. This block has also a separate dining-hall, kitchen, and stores, &c. Besides the asylum there will be erected a large farm, a chapel, a doctor's house, a gate lodge, and a mortuary. The buildings extend about 700 ft. both ways. The outside of the building is of red stone, and the inside is faced with white stone. Mr. J. Thomson & R. D. Sandilands, of Glasgow, are the architects for the structure, while the contractors are:—For the mason work, Messrs. J. Crackston & Son; for the joiner work, Messrs. James Herbertson & Son; for the plumber work, Mr. James L. Arnot; for the slater work, Messrs. Andrew M. Ross & Sons; for the plaster work, Mr. J. M'Kenzie; and for the painter work, Mr. James Moodie.

New Church, Avonmouth, near Bristol.—The foundation-stone of St. Andrew's Church, Avonmouth, was recently laid by Mrs. Miles, of Kingsweston. The site of the church is near the Dock station. Tenders were received for the erection of a church to hold 600 people, and that of Messrs. R. Wilkins & Sons, of Bristol, for 6,590*l*. for the whole church, except the top of the tower, has been accepted; but, as the funds are not all subscribed, it has been decided only to build part of the church. Therefore, only the east end of the church and two-thirds of the nave and aisle can be built, which will leave unbuilt the two western bays of the nave and aisle, and the whole of the tower and the vestry. The plans of the church have been designed by Mr. W. Wood Bethell, of London, and show a structure which is founded on the Decorated period. When completed the building will consist of a chancel, nave, nave south aisle, and chancel south aisle. Provision is made for accommodating the school-children in the chancel south aisle, where also the organ will be placed. At the chancel end of the nave the tower will be erected. The church will be so constructed that the north wall can be removed and another aisle added. The structure is of red stone, quarried in the parish of Shirehampton, and lined with Bath stone. Provision has been made for the tower on a large bed of concrete. The roofs will be covered with Broseley tiles, and inside they will be of pitch-pine. Ultimately the chancel will be laid with marble mosaic work. Mr. G. Downs is clerk of the works.

Graduation Hall and Students' Union for Aberdeen.—According to the *Scotsman*, plans have been prepared, and building operations will commence in the spring, for the construction of a Graduation Hall and Students' Union at Marischal College. This new adjunct to the University is the gift (the structure will cost 15,000*l*.) of Mr. Charles Mitchell, of the firm of Lord Armstrong, Mitchell, & Co., Newcastle-on-Tyne. The building is intended to form a portion of the large scheme of extension recently sanctioned by the University Court, and will be erected in the rear, or east side, in connexion with the present halls and museums. The Graduation Hall will measure 100 ft. long by 40 ft. wide, and will have a small gallery projecting from the side walls, and a raised daïs at the east end, with stalls round the sides having carved oak canopies. Filling the entire width of the east end of the hall will be a Perpendicular Gothic window of stained glass. The hall will be otherwise lighted by five windows on each side of the apartment, and the roof will be arched in timber, vaulted form, and enriched with moulded ribs and carved bosses at the intersections. The flooring will be of solid oak parquetry bedded on concrete. Externally the walls will be of light grey Kemnay granite, the interior being lined with pink granite ashlar, except a high panelled dado of oak, which will surround the lower part of the walls under a small projecting gallery, which will also extend round the sides and west end. There will be four staircases for access to the hall, but the main approach is from the quadrangle by means of the existing staircase. The present Graduation Hall is to be converted into a picture gallery, and one of the approaches to the new hall will be through it. The hall itself will accommodate 1,250 persons seated. Immediately under another floor is to be set apart for the purposes of a Students' Union, and will consist of a large debating hall, 55 ft. by 30 ft., on the mode of the House of Commons, with division lobbies and side galleries; also a billiard-room, 24 ft. by 30 ft., a refreshment-room of the same size, a steward's room, and a still-room, store-room, cloak-room, lavatory, committee-room, and reading-room. A floor below the Students' Union will contain the anatomical museum and professors' room. The architect is Mr. Mackenzie, of Messrs. Matthews & Mackenzie, Aberdeen.

SANITARY AND ENGINEERING NEWS.

Drainage Schemes, Mytholmroyd, Yorkshire. — We understand that the Local Board has awarded the first premium, in respect of the twelve schemes submitted in public competition for the drainage of this district, to Mr. Fredk. Beesley, M.Inst.C.E., of Westminster. The scheme selected comprises the treatment of the sewage in tanks and filters, and passing the effluent over the land at the outfall, previous to its discharge into the river Calder. The estimated cost of the work is about 12,000*l*.

The Hornsey Local Board's Museum of Sanitary Appliances will be opened to the public by the Lord Mayor on the 8th inst. We gave some particulars of it in the *Builder* for June 25 last, p. 505.

Institute of Certified Sanitary Inspectors.—The opening meeting of this new society will take place this Saturday, December 3, at the Sanitary Institute, Margaret-street, W.

Art-Union of London.—The work presented this year to subscribers is an etching by Mr. R. W. Macbeth of his picture entitled "Late for the Ferry"; not a work which interests us very much, but it is one that is likely to be popular, representing in a picturesque manner a kind of every-day incident which the middle-class mind can grasp. The town seen at the other side of the river, and which forms the background of the scene, is picturesquely treated. The Council of the Society request the attention of subscribers to a special issue of a large engraving by Mr. McCulloch from Sir John Millais's interesting work called "A Souvenir of Velasquez." This is a fine engraving, though showing the old tendency of Art-Union engravings to run to an unnecessary size.

FOREIGN AND COLONIAL.

FRANCE.—The Society of Provincial Architects has addressed a petition to the Senate protesting against the system proposed by the Government for the reconstruction of the Opéra Comique. This protestation, which has been seconded by the Société Centrale des Architectes (of which the *Builder* has already made mention), is approved of by the Presidents of thirty-one societies, and which represent sixty-five Departments.——By reason of his duties as Director of the Academy of France in Rome, the sculptor Eugène Guillaume has been appointed instructor during the school terms 1892-93 in the history and æsthetics of art by M. Georges Lafenestre.——A committee has just been formed in the Vosges for the purpose of erecting a monument to Doctor Villemin, at Prez-Sous-Bruyères. He was Medical Inspector of the Army.——M. Sabatier, who has lately died, has left 10,000 francs to the Maison de Retraite Galignani, to be given to the pensioners of this establishment, who are named by the Académie des Beaux-Arts.—— Two Lyons painters, MM. Barriot and Balouzet, have organised an exhibition of their paintings on the Quai St. Antoine, at Lyons. The exhibition contains about 150 pictures.——On December 15, at Marseilles, the fourth exhibition of pictures by native artists will be opened, and will remain open till January 15. ——The death is announced, at Algiers, of M. Edouard Bauer, Inspector of Fine Arts for all Algeria.——M. Georges Legrain, the Egyptian *savant*, who a few years ago gave such an interesting account of Gondeah, to the members of the Architectural Congress, has just been made a member of the French Institute of Oriental Archæology in Cairo.——M. Chassevent Bacque has lately finished some portraits of eminent sea painters for the Ministry of Marine. They will be placed in the great hall of honour, as well as six decorative panels by M. Boulicaut.

BERLIN.—The twenty-fifth anniversary of the foundation of the Berlin "Kunstgewerbe" Museum and its Arts and Crafts Schools has been celebrated with much ceremony, the Empress Frederick, as patroness of the institution, receiving enthusiastic applause. The "Kunstgewerbe" Museum is one of the few German institutions which was started with voluntary subscribed capital and without a Government subsidy. Since 1885 the collections and schools have become State property. Prior to the transfer there had, however, been some Government aid, and the collections had already been housed in their new home. Messrs. Gropius and Schmieden were the architects of the new Museum building. Professor Lessing is curator in chief, and Professor Ewald the present master of the schools. —— The preliminary budget of the "Reichstag" shows that the cost of the Houses of Parliament in course of erection has now been definitely fixed. The 1,500,000*l.* already voted will officially cover the expenses for the building, but this sum does not include an extra 100,000*l.* for the necessary sculptural and fresco decoration, nor some 65 000*l.* for fittings and furniture.——An extension of Schinkel's old museum has been completed in the form of a new sculpture-hall, some 60 ft. long. Its proportions and decorations are much admired, and the Renaissance sculpture which has been placed in it receives excellent light.——The great Government Travelling Studentship for Architecture, which is open to competition biennially, has been awarded to Reg. Bm. Otto Schmalz. Herr Schmalz, who in 1886 was noted as the youngest architect on special Government service, is known as the winner of the Schinkel Medal and many competitions. He has been on the architectural staff of the New Imperial Law Courts in Leipsic, a senior assistant to Messrs. Ende & Boeckmann, of Berlin, and is now working in the atelier of the new Houses of Parliament. A similar Travelling Studentship to painters has been awarded to Herr A. Frenz.—— The post of Technical Attaché to the German Embassy in London, which has been open for some time, will probably now be filled by an architect. The post of Technical Attaché at Rome will not be filled this year.——A new book treating of Berlin architecture is to be brought out on similar lines with the existing publication on Cologne, Hamburg, Frankfort, Leipsic, &c. The two Berlin architectural societies will work together in the matter. They have elected the editors and a committee from among their members. The editors of our two Berlin contemporaries ("Baurath" Hossfeld and Herr Fritsch) are on the committee.—— The street names are in future to be shown in black printed characters on a white enamel background, in lieu of the present white lettering on a blue background. At each corner the numbers of the houses in the block will be shown in the same way just below the street name. The question of colours for the street plates has been subject to very careful investigations. The old plates looked very neat, but were not clear enough.——The Statistical Office publishes some figures which would seem to show that the expected building crash is pending. The increase of population is about 3 per cent., with a tendency to decline, whilst the increase in tenements is 5-6 per cent.——Another fine model has been promised for the German architectural group at the Chicago Exhibition. Professor Schwechten is having one made of the new Memorial Church to the late Emperor William, and intends to exhibit it.——No fewer than sixteen of the old Rhenish churches are being restored at present. For most of these renovations Government aid has been granted. —— The eminent civil engineer, "Geh. Oberbaurath" L. Hagen, has died at the age of sixty-three. He was a well-known figure at all international congresses, and enjoyed the repute of being both a great *savant* and a popular professor.

VIENNA.—Several of the series of competitions for public works to be carried out during this decade have now been opened. The competition for a scheme for the future development of the city is the most important, one for new municipal gas-works being second. Both these competitions are international. In the first, premiums of a value of 38,000 florins will be awarded; in the second, premiums to a value of 16,000 florins. Ample time is given, in the one case a year, in the other six months. Large expert juries will act as assessors. ——On the 10th inst. "Baurath" Helmer will give a lecture on "Modern theatre construction and the new Zurich Theatre."

SWITZERLAND.—The controversy as to Messrs. Fellner & Helmer's design for the proposed Zurich Assembly Rooms (see "Note," p. 391, *ante*) has been decided by a special commission. The charges of the Zurich architects are overthrown. We hear that there will now, however, be a second competition between Professor Blunschli and the Vienna firm. ——Lucerne is to have a large new railway station. ——Basle is to have a large provisional concert-hall at the cost of 65,000 francs. It will be erected in time for a great musical gathering. A competition for the design has been opened.

MISCELLANEOUS.

THE EDWARDS PROFESSORSHIP OF EGYPTOLOGY. —We are glad to learn that Mr. Flinders Petrie has been appointed as the first incumbent of the Chair of Egyptology founded by the bequest of the late Miss Amelia B. Edwards. There could have been no better appointment made; indeed, we may say that it was almost a foregone conclusion.

FIRE IN EDINBURGH.—By a fire which broke out in Edinburgh on Saturday last the premises of Messrs. Charles Jenner & Co., silk mercers and drapers, were totally destroyed. The premises in question occupied one of the finest sites in the city, immediately opposite the Scott Monument, having a frontage of more than 100 ft. towards Princes-street, and extending to about 200 ft. along the west side of South St. David-street. From an architectural point of view there is nothing to regret, the Princes-street frontage having consisted of the original houses of three stories and an attic, devoid of architectural features, and the ground floor having great sheets of plate-glass in iron fixings. The premises in the rear facing St. David-street have been added to the original shop from time to time, and were five stories in height, embellished with compo-ornamentation. The buildings, estimated as having been worth 120,000*l.*, are in a tottering state, and will have to be removed, thus affording an opportunity of adding greatly to the amenity of the city. The fire is stated to have originated in the basement, about the centre of the premises, and the rapid spreading of the conflagration to have been facilitated by a lift extending from the basement to the attic. The additions made to the buildings from time to time rendered it necessary to insert many iron beams, and the heating, and consequent expansion and twisting, of these has tended greatly towards the destruction of the walls. The fire is stated to have been the largest which has occurred in Edinburgh during the last fifty years, and to have involved a loss of a quarter of a million.

MAIN ROAD ARBITRATION: BURTON-UPON-TRENT CORPORATION *v.* STAFFORDSHIRE COUNTY COUNCIL. —Owing to a difference between the Town Council of Burton-upon-Trent and the Staffordshire County Council on the question of the cost of maintenance of the main roads within the borough for the year 1890-91, an appeal was made by the Corporation to the Local Government Board as provided under the Act of 1888. Accordingly, on the 16th ult. Mr. Codrington, on behalf of the Local Government Board, held an inquiry at Burton on the subject. Mr. Macmorran, barrister, appeared for the Corporation, and Mr. Boddam, barrister, for the County Council. It appeared from the opening statement of Mr. Macmorran that the original amount in dispute between the authorities amounted to about 792*l.* The County Council repudiate entirely any liability in respect to the maintenance and repair of the footpaths, and dispute also the amount claimed for the maintenance of the roads, on the ground of excessive expenditure. This the Town Council do not admit, and maintain that the County Council are liable to pay for the maintenance of the main roads (including footpaths) in such a manner as the circumstances of the case require, and that it is quite unfair to compare the expenditure necessary on busy urban roads with that necessary on the ordinary roads maintained by the county, upon which basis the contribution is apparently fixed.—Mr. J. E. Swindlehurst, the Borough Surveyor, was the first witness on behalf of the Corporation, and was under examination the greater part of the day. —Mr. Eayrs (Surveyor of West Bromwich), Mr. Hooley (County Surveyor of Nottingham), and Mr. Harley, of Stafford, gave evidence and supported the case for the Corporation.—Mr. Boddam, for the County Council, stated that the chief matters in the claim to which the county objected was the entire charge for the repairs and maintenance of footpaths, this the county repudiate; street watering, scavenging, and the charge for steam roller hire.—Mr. Boddam contended that the county was only called upon to pay such a contribution "towards" the cost of the roads within the borough as in the opinion of the County Council the roads would have cost them if maintained in the same manner as the ordinary roads of the county. Counsel admitted that the Corporation might have spent the money on the roads, as was shown by the books, —the books, like the roads, being, he stated, the best-kept in the county,—still the County Council contended that the fact of the roads being urban roads did not alter the liability of the county as regarded their contribution "towards" the amount expended. The only witness called in support of the county was Mr. Moncur (Chief Surveyor of Main Roads of Staffordshire). After an exhaustive investigation, the case terminated, and the Inspector will make his report to the Local Government Board.

LARGE CLOCK FOR LIVERPOOL. — A very large Cambridge quarter-clock, showing the time on four external mosaic dials 11 ft. each in diameter, and striking the hours and quarters upon five bells of the total weight of 5 tons 1 qr. 10 lbs., also driving the hands of three large dials, fixed inside the building, by an electrical arrangement attached to the clock movement, has been presented to the City of Liverpool by Mr. W. P. Hartley, and fixed in the Jubilee Tower of the Liverpool University College. It was set going by the donor on November 15, in the presence of a number of visitors. The clock and electrical apparatus were supplied and fixed by Messrs. Wm. Potts & Sons, of Leeds, who also made the large clock at Mr. Hartley's works, Aintree, Liverpool.

THE ARTISTS' BENEVOLENT FUND.—The 83rd anniversary dinner of this Fund was presided over, at the "Criterion," on Saturday evening last, by Sir Edward Clarke, Q.C., M.P., and it resulted in subscriptions and donations amounting to about 500*l.*, including the Queen's annual donation of 100 guineas. The Chairman expressed high approval of the constitution of the "Artists' Fund," which was established in the year 1810, and received in 1827, from George IV., a Royal Charter of Incorporation. The Artists' Annuity Fund is raised and wholly supported by the contributions of its members for their own relief in sickness or old age; it neither asks for nor receives any support from the public. All artists in painting, sculpture, architecture, and engraving, are eligible to become members. The Artists' Benevolent Fund is purely charitable, and has for its object exclusively the relief of the widows and orphans of members of the Annuity Fund left in need. During the past year 44 widows and 17 orphans received annuities amounting in the whole to 981*l.* 2s.

MEETINGS.

FRIDAY, DECEMBER 2.

Architectural Association.—Mr. John Brett on "Daylight in the Dwelling-house." 7.30 p.m.

Junior Engineering Society.—Mr. Harry Fraser on "Water-Tube Steam Boilers." 8 p.m.

SATURDAY, DECEMBER 3.

Sanitary Inspectors' Association.—Mr. John Hutton, Chairman of the London County Council, on "An Attempt to Improve the Sanitary Circumstances of London." 6 p.m.

Institute of Certified Sanitary Inspectors.—Opening meeting. 8 p.m.

MONDAY, DECEMBER 5.

Royal Institute of British Architects.—Mr. William C. Street on "Some Problems of Town and City Developments." 8 p.m.

Surveyors' Institution.—Mr. J. Douglas Walker, Q.C., on "Rights of Way." 8 p.m.

Society of Engineers.—Mr. A. G. Dury on 'The Shortlands and Nunhead Railway." 7 30 p.m.

Society of Arts (Cantor Lectures).—Professor Vivian B. Lewes on "The Generation of Light from Coal Gas." III. 8 p.m.

Liverpool Architectural Society.—Mr. John Slater, B.A., on "Bricks and Brickwork." 6 30 p.m.

Leeds and Yorkshire Architectural Society.—Mr. A. Keen on "Vaulting." 7.30 p.m.

TUESDAY, DECEMBER 6.

Institution of Civil Engineers.—Further discussion on Mr. John Rigby's paper on "The Manufacture of Small Arms." 8 p.m.

Glasgow Architectural Association.—Mr. A. N. Paterson on "Colour as a Means of Architectural Expression." 8 p.m.

WEDNESDAY, DECEMBER 7.

Society of Arts.—Mr. James Dredge on "The Chicago Exhibition, 1893." 8 p.m.

British Archæological Association.—Paper to be read by Mr. C. H. Compton, entitled "Have I Found the Roman Station of Bibracte?" 8 p.m.

Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting. 8 30 p.m.

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premium.	Designs to be delivered.
Pavilion (20,000 seats), Pontypridd	Com. of the Royal National Eisteddfod	.....	Jan. 1
*New Buildings, near Horsham	Council of Christ's Hospital	3 of 400*l.* each, &c.	No date

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Laying-out Cemetery, Walls, Roads, &c...	Tudhoe (Durham) Bur. Board	J. Henry	Dec. 6
River Wall, Open Conduit, &c. Swanpool	Stockport Waterworks Co.....	H. Robinson.....	do.
Roadmaking, Atkinson-road, Ashton-on-Mersey.....	Altrincham R.S.A. ..	J. M'D. M'Kenzie	do.
Roadmaking at Green Castle, Belfast, &c.	J. Barbour.....	Young & M'Kenzie....	do.
Road Construction	Bootle Corporation ..	J. A. Crowther.....	do.
Re-building Business Premises, Maryport, Cumberland	Lightfoot & Cockbain, Limited	C. Eaglesfield	do.
House, New-street, Rothes, N.B.	Occupier.....	.....	do.
Cast iron Water Pipes, &c. Newcastle-on-Tyne.....	N. E. R. Co.	*Official*	do.
Iron and Metal Castings, &c. Darlington	do.	do.	do.
Steel Bridge Pier Cylinders	India Office	do.	do.
Cement, Sanitary Pipes, Whinstone Kerbing, &c	Newcastle-on-Tyne Impt. Com.....	do.	do.
Buildings at Sewerage Works	Whitehaven Town and Harbour Trustees ..	do.	do.
*Kerbing and Channelling Work.....	Lewisham Bd. of Wks.	do.	do.
Private Improvement Works, Roads, &c.	Halifax Corporation..	E. R. S. Escott.....	Dec. 7
Extension of Sluice, Benacre, Suffolk	Com. of Kessingland Level.....	W. J. Roberts	do.
Sanitary Appliances, &c	Southport Corp.	W. Crabtree.....	do.
Model Lodging House, Sheffield.....	.....	Robt. Dixon.....	do.
Supplying and Fixing Stone Kerb (1,000 feet)	Newbury Corporation	E. A. Stickland	do.
Cast-iron Gas Mains (1,000 yards)	Stockport Corporation	S. Meunier.....	do.
Entrance Lodge, Hedgecocks, Horsham..	.....	Wm. Buck	do.
Timber, Axles, &c.	London General Omnibus Co. Limited	.....	Dec. 8
Lead Service Work and Cast-iron Pipes ..	Cardiff Corporation ..	J. A. B. Williams	do.
Cast-iron Socket Water Pipes	do.	do.	do.
*Sewerage Works, &c.	Epping R.S.A.....	E. Egan	do.
Drainage Works, Aboyne, N.B.....	.....	John Campbell	do.
Six Terrace Houses, Roads, &c. Ilkley....	.....	C. E. Marsden.....	do.
Blue Granite Spalls, Rotherhithe.....	St. Olave's Union	*Official*	do.
Granite Spalls (200 tons)	Strood Union	do.	do.
Iron Castings	City of Dublin Steam Packet Co.	do.	do.
Timber	Newcastle-on-Tyne Corporation	do.	do.
Brick Sewer, Wilton-crescent	Glasgow Police Com.	do.	Dec. 9
Supply and Laying Cast-iron Water Pipes (4,150 yards)	Blaydon Local Board, &c. Water Supply ..	do.	do.
Fire Brick or Cement Block Channel, Kingstown.....	Carlisle R.S.A.	do.	do.
Wesleyan Church and School, Gilberdike	Trustees.....	.....	do.
Semi-detached Houses, Savile Town, Dewsbury	.....	R. Castle	do.
Business Premises, Cardiff	Jas. Howell	J. P. Jones	do.
Residence, Calverley, Yorks.....	.....	J. P. Kay	do.
Road Work	Northumberland C. C.	H. F. Sney'd-Kynnersley	Dec. 10
Sewer Pipes, Castings, &c.....	King's Lynn Corp	E. J. Silcock.....	do.
Iron and Steel Castings, &c.....	East Hetton, Trimdon and Trimdon Grange Collieries.....	W. Scott.....	do.
Railway Works, Crispino-Fosso-Cannecchi	Italian Ministry of Public Works	*Official*	do.
Street Works, Batley, Carr	Batley Corporation ..	do.	do.
Granite Road Metal (900 tons).....	do.	do.	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Additions, &c. to Police Station, Mumbles, Swansea	Glamorgan C. C.....	*Official*	Dec. 10
Lime, Cement, &c.....	Crystal Palace Co.	do.	Dec. 12
*Ornamental Lamp Columns.....	Islington Vestry.....	do.	do.
*Making Carriageway, Upper Holloway ..	do.	do.	do.
*Construction of Sewer.....	do.	J. P. Barber	do.
Lavatory and other Buildings.....	Axbridge Union	Price & Wooler	do.
Dwelling-house, South-street, Elgin, N.B.	.....	C. C. Doig.....	do.
*Well Boring, Isle of Wight	Ryde Town Council ..	F. Newman	do.
Fittings for Corporation Offices, Science School, &c.....	Rochester Corp.	Goldsmith & Gosling..	do
New Road, Portishead, Bristol	.....	J. B. Sturge & Sons....	do.
*New Inset Wall, Bawliff Hall Farm.....	Fobbing Level Com.	W. R. Kinniple	Dec. 13
*Roadmaking Works.....	Willesden Local Board	O. Claude Robson	do.
*Hot-water Supply and Warming Apparatus	Met. Asylums Board..	A. & C. Harston	Dec. 14
Supply and Fitting Cooking, Laundry, and Heating Apparatus, &c. East Poor-house Hospital.....	Dundee Parochial Bd.	Wm. Alexander	do.
*Additions, &c. to Eaglescliffe Station	N. E. R. Co.....	W. Bell	do.
Foundations, Post Office, Liverpool.....	Com. of H. M. Works	*Official*	do.
*Supply of Materials, &c.....	Herne Bay Local Bd.	do.	do.
Road Metal, Cement, &c.	Dublin Port & Docks Board	do.	do.
Paving Setts	.....	do.	do.
Railway Construction, Stanislan-Voronienka Line	Austrian State Rys. ..	do.	Dec. 15
Alterations to School and Chapel, Naas, co. Kildare.....	Rev. Dr. Comerford ..	.....	do.
Nine Bridges, Centre Canal.....	Sôane et Loire Prefecture	do.	Dec. 16
*Works and Materials	St. George's Parish, Hanover-square	do.	Dec. 17
*Engine and Boiler Houses, Offices, &c.....	Manchester Corporation Waterworks....	do.	Dec. 19
*Construction of Sewer, &c.	Vestry of St. Leonard, Shoreditch	do.	Dec. 20
Lime (2,000 tons), Knostrop.....	Leeds Corporation....	T. Hewson.....	do.
*Victoria Stone Paving and Sewer Work..	Chiswick Local Board	A. Ramsden.....	Dec. 21
Drain Pipes, Castings, &c.....	Macclesfield Local Bd.	*Official*	do.
New Waterworks, &c. Transylvania.....	Kronstadt Magistracy	do.	Dec. 22
Irrigation Works, River Ebro	Spanish Ministry of Public Works	do.	do.
Reservoir, Varteg Hill	Pontypool Gas & Water Co.....	do.	Dec. 31
*New Staircase at Town Hall.....	New Windsor T. C. ..	do.	do.
Water and Sewerage Works.....	Treport (Seine Imp.) Municipality.....	do.	No date
Additions, &c. Hartwell House, Exeter ..	C. R. Collins	J. W. Rowell & Son ..	do.
Heating and Ventilating Technical College	Derby Corporation	Waller & Son	do.
Excavators' Work, Craiglands, Leeds	Hydropathic Establishment.....	....	do.
Building Dry Stone Dykes, Rubislaw, Aberdeen	.....	Walker & Duncan	do.
Street-making (500 yards) Bradford, Yorks	.....	J. Hindle	do.
Road Works, Bulwell, Notts	.....	Edwin Clarke	do.
Block of Houses, Goole	Goole House Property Co. Lim.	Smith & Brodrick	do.
Reading Room Hulme	Manchester Corp.	J. Gibbons Sankey....	do.
Mortuaries, Hunslet Cemetery	Leeds Corporation....	*Official*	do.
Additions to Hydropathic Establishment, Ilkley	Cra'glands.....	J. s. Atkinson	do.
Villa Residences, Grass Farm Estate, Finchley.....	.. ..	Stephen Salter, & Adams	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Building Inspector	Hornsey Local Board	160*l.*.....	Dec. 9
Superintendent of the Works Department	London County Council	700*l.*.....	Dec. 12
Secretary and Lecturer (Carpentery, &c)	Dorset C. C. (Technical Instruction Com.)	300*l.* & 250*l.* allowances	Dec. 15
Surveyor	Keynsham High. Bd.	150*l.*	Dec. 17

Those marked with an Asterisk (*) are advertised in this Number. *Competition, p.* iv. *Contracts, pp.* iv., vi., *&* viii. *Public Appointments, p.* xx.

Liverpool Engineering Society.—Mr. Thomas Morris on "Elementary and other Notes on Iron." 8 p.m.

Institution of Civil Engineers of Ireland.—Meeting to be held in the New Hall, Dawson-street, Dublin.

THURSDAY, DECEMBER 8.

Hornsey Museum of Sanitary Appliances.—Opening by the Lord Mayor.

Society of Antiquaries.—8.30 p.m.

SATURDAY, DECEMBER 10.

Institution of Civil Engineers.—Students' visit to the Machinery and Inventions Division, South Kensington Museum, 2 to 4 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

16,204.—PIPE JOINT: *J. R. Blandford.*—This specification refers to an improved pipe-joint, consisting of a straight circular stoneware or fireclay pipe, with a composition band run on each end of the pipe, the collar being made in two parts, named a block and cap. The block is made so as to permit of the invert half of the joint being made first. It is inverted on the inside and square on the outside, thereby securing a solid foundation for the pipe. The cap is then bedded on the upper half of the pipe, making what is claimed to be a perfectly secure and watertight joint.

21,613.—VENTILATORS: *P. N. Walker.*—This invention relates to ventilators for carrying off vitiated air and the products of combustion from rooms and buildings, and is specially arranged to prevent direct inrush of cold air and to exclude rain and down-draughts. The inventor employs an outer and an inner casing, preferably two concentric cylinders, through each of which are openings for the admission of air to cause the up or exhaust current. Above the parts just described, and supported by the outer casing, is an angular-shaped chamber, there being a central opening or exit passage way above the chamber for escape of air. Above this outlet is a flat plate, preferably having a cone-shaped top. Within the angular space above referred to, and extending to the centre between the concentric casings, is a slightly concave plate for the purpose of preventing water of condensation, snow, or rain passing down the main shaft. A horizontal plate is also placed within and at the junction of the lower part of the angular space, which plate, through perforations, serves to direct any rain-water or moisture to the outlet at the bottom of the outer casing.

22,036.—SASH BAR: *W. D. Tucker.*—This specification describes an improved anti-drip sash bar, more especially applicable for greenhouses, forcing-frames, and the like, under which plants, such as orchids, are cultivated, and where it is particularly desirable to protect the plants from the drippings of water from the roof or cover. The sash bar is formed with rabbets on its upper side or top for receiving the glass, in the ordinary manner, and is provided on its lower side or bottom with longitudinal grooves or channels, into which any water leaking through the joints of the covering falls, and by which it is conveyed to a suitable gutter or other receptacle, or to the outside of the building or frame.

10,815.—SASH WEIGHT: *G. Glasson.*—The objects of this invention are to cheapen the hanging of sashes, and to provide a means of hanging both sashes, in or behind narrow window mullions. The inventor employs a weight carrying an axle pulley, or its equivalent, either concealed inside the same or attached thereto. The cord is passed round this axle pulley, and each end fastened to one of the sashes, thus hanging both sashes with one weight on each side. By suspending the weight in this manner, it is claimed that there is no jamming, confusion, or clashing of weights; that no parting slip, less sash-cord and weight are required, that there is absolute freedom from noise; and that the top sash will always close up to the head of the window-frame, the sashes are more easily fixed, and the cord cannot untwist. Another great advantage is that it permits of hanging both sashes behind a very narrow mullion, two weights only being used, one behind the other, instead of four as hitherto.

15,642.—GLAZED STRUCTURES: *H. J. Pullen-Burry.*—This invention relates to the glazing of roofs or structures to which it may be applicable. The cross-bars, which support the horizontal edges of the glass, are made each with a groove running along its lower side at a small distance from the edge of this side and the upper face. The upper face of the bar is rebated along its upper lying edge, and the floor of this rebate is chamfered or bevelled off towards the upper side of the bar. The depth of rebate at its shallowest part is as nearly as possible the same as the thickness of glass employed for glazing, and the angle of bevel is sufficient to cause the upper edge of the bevelled face to be at a slight distance from the under surface of the glass when in its place with the upper edge of the glass in the aforesaid groove, on the under side of the bar next above. This forms, when the glazing is complete, a V-shaped space between the under surface of the glass and the upper surface of the bar. This space serves to receive moisture, which may condense and run down on the under or inner side of the glass, an outlet for this moisture being found by a suitable number of grooves made in the outer face of the bar, and running into the rebate. The glass is retained from slipping out of the rebate by nails or screws with sufficiently broad heads driven or screwed into the bar, so that the heads overlap the edge of the glass.

16,406.—VENTILATORS: *C. A. Cowell.*—This specification relates to apparatus for use in ventilating drains, sewers, buildings, and other places, and has for its object to render such ventilation more efficient than hitherto by ensuring that a proper quantity of air passes in one direction as required, while it is prevented from passing in the other direction. It consists, as applied to an inlet or downcast ventilator, of a casing or head having two or more faces with openings therein, which may either be left clear or be covered by a grid. At the inner side of each of these openings is fixed one or more valves, or flaps, of mica, talc, aluminium, or any suitable substance, which are so hung as to open freely to admit of the inlet of air, but will immediately close should there at any time be a reversal of the current. These valves are so arranged that in their action they do not interfere with each other, and that when open they act as deflectors of the air in the direction of the shafts from the casing on head. When the ventilator is to allow of the escape of air, but not of its inlet, then the flaps or valves are arranged so that they open and close under the action of the air current in the reverse way to that described.

NEW APPLICATIONS FOR LETTERS PATENT.

November 14.—20,551, W. McGeoch, jun., Door Handles.—20,592, L. Leots, Door-closing Apparatus.—20,593, F. Rose, Automatic Disinfecting Apparatus for the Seats of Closets, &c.—20,602, C. Britcher, Electric Bellpush.

November 15.—20,609, W. Best, Brick Carrier.—20,623, W. & E. Freeman, Securing Window Sashes Doors, &c.—20,652, J. Dawson, Planes for Carpenters, Joiners, Cabinetmakers, &c.—20,656, W. and J. Oakes, Kilns for Bricks, Lime, &c.

November 16.—20,708, T. Payne, Fire Grates, Stoves, Ranges, &c.—20,742, H. Evans, Waste-water Flushing Closet.—20,743, H. Watson, Smoke-preventing Cowl.—20,745, J. Mitton, Set Squares.—20,753, T. Mepham, Venetian Blind Suspender.—20,760, J. Neate, Chimney Top or Cowl.—20,767, E. Preston and D. Pinkey, Syphon Water-Waste Preventer.—20,779, T. Utley, Combined Side Light or Scuttle and Ventilator.—20,781, S. Holman, Heating and Ventilating, more especially intended for use in Creating Currents for the Ventilation of Sewers.—20,790, H. Finn, Smoke-Preventer.

November 17.—20,832, E. von Hunersdorff, Bricks or Blocks for Building Purposes.—20,847, J. Knight, Radiator for Warming Buildings and utilising Heat wasted in Chimneys.—20,866, R. Carey and R. Goudge, Ventilating Apparatus for Drains.—20,891, R. Matthews and J. Noad, Manufacture of Whitelead and Coloured Pigments.

November 18.—20,906, J. Hamilton, Rollers or Calenders for Printing and Embossing Materials used for Wall Decorations.—20,930, J. Smith and J. Shuttleworth, Flushing Cisterns.—20,933, J. Duffell and Others, Sash-fasteners.—20,937, L. Danois, Decorative Material for Paper Hangings.—20,933, J. Shanks, jun., Urinals.—20,981, J. Craven, Screw Presses for Pressing Bricks, &c.

November 19.—21,064, H. Lockwood, Composition for Flooring or Covering Iron Bridges, Arches, &c.—21,070, J. Cathrein, Door Locks.

PROVISIONAL SPECIFICATIONS ACCEPTED.

17,335, J. Doughty, Apparatus for Examining Drains.—17,754, O. Berend, Filing and Setting Saws.—18,044, H. Haynes, Fastening Doors, &c.—18,057, J. Ryder, Preparing Clay in the Manufacture of Bricks.—18,119, L. Salzberger and J. Reindl, Hinges.—18,255, W. Crow and S. Lehmon, Gullies and Drains.—18,735, H. Lake, Paint or Cement.—18,785, G. Smith and J. Parrott, Secret Bolt for Doors, &c.—19,219, E. North, Appliance for Keeping the Cavity of Hollow Walls clear of Mortar, Droppings, and other substances during the course of erection.—19,343, C. Lamb and H. Vickers, Supporting Rain-water and Soil-pipes to Prevent Overflow of Water from leaky joints flowing down walls, also Enabling Pipes to be Painted and Caulked for passing Sanitary Tests.—19,762, R. Sims, Planes.—19,904, F. Booley, Device for Opening Windows.—19,956, A. Greig, Brick Machines.—19,970, J. Yeadon and W. Adgie, Fire-bricks, Retorts, Crucibles, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

21,570, H. Leigh, Multiple Saw-frames.—827, W. Orr, Metallic Girders.—1,628, S. Gratrix, jun., and Others, Gas Chandeliers.—2,224, G. Spencer, Window Sash-fasteners.—6,511, W. Morrison, Roof Ventilators.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

NOVEMBER 21.—By *Prickett & Ellis*: F.g.r. of 38*l.* 4s., Walmer-rd., &c., Notting Hill, reversion in 71 yrs., 820*l.*; f.g.r. of 18*l.* 18s., Walmer-rd., reversion in 71 yrs., 400*l.*; f.g.r. of 12*l.* 12s., Calverley-st., ditto in 71 yrs., 260*l.*; f.g.r. of 27*l.*, Manchester-rd., ditto in 71 yrs., 560*l.*; No. 84, Maida Vale, u.t. 44 yrs., g.r. 12*l.* 10s., 800*l.*—By *Elgood & Fuller*: No. 30, Great Portland-st., u.t. 56 yrs., g.r. 32*l.*, r. 270*l.*, 2,000*l.*; 40, Bolsover-st., u.t. 9 yrs., g.r. 20*l.*, r. 80*l.*, 340*l.*—By *Carey & Lewis*: 28 and 29, Alma-rd., Canonbury, f., r. 61*l.*, 820*l.*—By *Slee, Son, & Carden*: F.g.r. of 12*l.* 12s., Lichfield-grove, Finchley, reversion in 78 yrs., 290*l.*; f.g.r. of 8*l.* 8s., ditto in 78 yrs., 195*l.*; f.g.r. of 12*l.* 12s., Station-rd., ditto in 81 yrs., 290*l.*—By *Montagu & Robinson*: 35, Lisson-grove, Marylebone, f., r. 55*l.*, 840*l.*; 12, Angel-rd., Hammersmith, u.t. 50 yrs., g.r. 4*l.*, r. 30*l.*, 280*l.*; 49, Sharsted-st., Kennington, u.t. 74 yrs., g.r. 6*l.*, r. 34*l.*, 290*l.*—By *E. Wood*: 53, Sunderland-rd., Forest-hill, u.t. 88 yrs., g.r. 11*l.*, 590*l.*; 15, Sunwell-st., Peckham, u.t. 73 yrs., g.r. 3*l.* 15s., 175*l.*; 12, Exeter-st., Marylebone, u.t. 23 yrs., g.r. 18*l.*, 145*l.*; 48 and 50, Shorrolds-rd., Walham-green, u.t. 87 yrs., g.r. 12*l.* 12s., 450*l.*; 2 to 12 (even), Poplar's-av., Willesden, u.t. 91 yrs., g.r. 48*l.*, 1,800*l.*; 55, Haverstock-rd., Haverstock-hill, u.t. 72 yrs., g.r. 10*l.*, r. 50*l.*, 420*l.*

NOVEMBER 22.—By *Bean, Burnett, & Co.*: 4 to 16 (even), 16A, 18, and 20, Tyers-st., Lambeth, u.t. 22 yrs., g.r. 85*l.*, 400*l.*; 12, Cunningham-pl., Maida Vale, u.t. 30 yrs., g.r. 10*l.*, 400*l.*; "Beechwood," Coolhurst-rd., Crouch End, u.t. 85 yrs., g.r. 15*l.*, r. 85*l.*, 850*l.*; 1 to 6, Prince's-st., Blackfriars, u.t. 16 yrs., g.r. 5*l.*, r., 249*l.*, 1,550*l.*; 41, Sekforde-st., Clerkenwell, u.t. 21 yrs., g.r. 6*l.*, r. 40*l.*, 405*l.*; 18, 19, and 20, Buxton-st, u.t. 5 yrs., g.r. 10*l.*, 135*l.*—By *F. W. Glazier*: 1, Tregunter-rd., Kensington, u.t. 39 yrs., g.r. 7*l.*, 1,120*l.*—By *Perkins & Cesar*: "Sunnyside," Central Hill, Norwood, u.t. 62 yrs., g.r. 10*l.*, r. 75*l.*, 660*l.*—By *Weston & Sons*: 2, Villa-rd., Brixton, u.t. 69 yrs., g.r. 2*l.*, 460*l.*; 15 and 19, Wingmore-rd., u.t. 76 yrs., g.r. 8*l.*, r. 60*l.*, 450*l.*

NOVEMBER 23.—By *H. Griffin*: 17, Home-rd., Battersea, u.t. 80 yrs., g.r. 5*l.*, r. 33*l.* 16s., 190*l.*; 31, Home-rd., u.t. 80 yrs., g.r. 5*l.*, r. 36*l.* 8s., 180*l.*; 1 g.r. of 30*l.* per annum, u.t. 80 yrs., g.r. 20*l.*, 157*l.*—By *Graves & Son*: 26, Ingrave-st., Battersea, and 1 g.r. of 38*l.*, u.t. 57 yrs., g.r. 36*l.*, 560*l.*; 90, Lavender-rd., u.t. 46 yrs., g.r. 3*l.* 12s., r. 36*l.*, 370*l.*—By *Humbert, Son, & Flint*: 207 and 209, Richmond-rd., Hackney, u.t. 74 yrs., g.r. 24*l.*, 1,750*l.*; 15, Queen Anne's-ter., Battersea, u.t. 85 yrs., g.r. 10*l.*, r. 44*l.*, 370*l.*; 19 and 20, Queen Anne's-ter., u.t. 85 yrs., g.r. 20*l.*, 620*l.*

NOVEMBER 24.—By *Stimson & Sons*: 126, 130, and 132, Camberwell-rd., Camberwell, f., 1,840*l.*; 11 and 13, Briant-st., New Cross, u.t. 27 yrs., g.r. 8*l.*, r. 61*l.* 4s., 255*l.*; 29, 31, and 33, Haunell-rd., Fulham, u.t. 85 yrs., g.r. 15*l.*, r. 83*l.* 4s., 310*l.*; 1 to 29 (odd), Selsden-rd., Peckham, u.t. 81 yrs., g.r. 75*l.*, 2,375*l.*; 2 to 24 (even), Selsden-rd., u.t. 81 yrs., g.r. 60*l.*, 1,940*l.*; 56 to 64 (even), Lugard-rd., u.t. 83 yrs., g.r. 22*l.* 10s., r. 157*l.* 8s., 1,160*l.*; 69 and 71, Lugard-rd., Peckham, u.t. 83 yrs., g.r. 9*l.*, r. 57*l.* 4s., 400*l.*; 76, Blythe Vale, Catford, u.t. 76 yrs., g.r. 4*l.* 10s., r. 50*l.*, 610*l.*; 21 and 23, Tintern-st., Clapham, u.t. 82 yrs., g.r. 12*l.* 2s., r. 55*l.*, 370*l.*; 37, 39, and 41, Tintern-st., u.t. 82 yrs., g.r. 18*l.* 3s., r. 84*l.*, 590*l.*—By *C. C. & T. Moore*: 20 and 22, Colby-rd., Gipsy-hill, f., 550*l.*; 15 and 17, Colby-rd., f., 430*l.*; 90 and 91, Suffolk-street, Poplar, u.t. 60 yrs, g.r. 6*l.* 6s. r. 51*l.* 4s., 320*l.*—By *Newbon & Co*: No. 290, Caldonian-rd., u.t. 51 yrs., g.r. 5*l.* 11s., r. 80*l.*, 810*l.*; 74, 76, and 78, Horseferry-rd., Westminster, u.t. 54 yrs., g.r. 6*l.*, r. 165*l.*, 1,700*l.*; 15 to 26, Lyall-rd., Old Ford, u.t. 54 yrs., g.r. 48*l.*, r. 436*l.* 16s., 2,965*l.*; 115, Riversdale-rd, Highbury, f., r. 32*l.*, 460*l.*—By *Glasier & Sons*: 22 and 23, Saville-row, Regent-st., and 1 to 9, Saville-pl., f., 13,550*l.*; 94, Marlborough-rd., Holloway, u.t. 80 yrs., g.r. 6*l.* 6s. r. 35*l.*, 330*l.*—By *Phillips, Lea, & Davies*: 4, Albert Villas, New Southgate, f., r. 32*l.*, 410*l.*; 30, High-st., Plaistow, sold privately.

NOVEMBER 25.—By *A. G. Windsor*: 19, Hyde-rd., Hoxton, f., 255*l.*; 148, Shepherdess-walk, u.t. 5 yrs., g.r. 5*l.*, 50*l.*—By *Toplis & Harding*: 5 and 7, Church-st., Chelsea, f., r. 170*l.*, 3,050*l.*—By *Harper & Co.*: 23, Dimsdale-rd., Fulham, u.t. 99 yrs, g.r. 1*l.*, 180*l.*—By *R. Reid*: No. 14, Old Bond-st., f., r. 750*l.*, area 2,348 ft., 20,000*l.*; 46 and 47, Albemarle-st., Piccadilly, f., r. 855*l.* 12s. 6d., 18,000*l.*; Nos. 166A, 167, and 168, Strand, f., area 2,692 ft., 18 000*l.*—By *Baker & Sons*: Enclosures of land, Belvedere, Kent, 23a. 3r. 14p., f., 3,850*l.*; f g.r.'s of 79*l.*, Storks-rd., Bermondsey, reversion in 48 yrs., 2,050*l.*; f.g.r. of 7*l.* 10s., Granton-rd., reversion in 48 yrs., 220*l.*; f.g.r. of 12*l.*, Major-rd., reversion in 48 yrs., 3,291*l.*; f.g.r. of 57*l.* 10s., Keetons-rd., reversion in 48 yrs., 1,558*l.*—By *Broad & Wiltshire*: F.g.r. of 53*l.*, Landor-rd., Stockwell, reversion in 87 yrs, 1,385*l.*; f.g.r. of 625*l.*, Hubert-grove, reversion in 87 yrs., 15,780*l.*—By *R. Tyser & Co.*: 1 to 10, Cornwall-pl., Lambeth, u.t. 16 yrs., g.r. 25*l.*, 300*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold: l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G. ton	9/0 0	0/0 0
Teak, E.I... load	9/10 0	15/0 0
Sequoia, U.S. ft. cu.	2/4	3/0
Ash, Canada load	2/10 0	4/0 0
Birch, do.	3/5 0	4/10 0
Elm, do.	3/10 0	4/15 0
Fir, Dantzic, &c.	1/16 0	3/10 0
Oak, do.	3/0 0	5/5 0
Canada.....	5/10 0	7/0 0
Pine, Canada red	2/10 0	3/10 0
Do, yellow	2/10 0	5/0 0
Lath, D'ntzic, fath	5/0 0	6/0 0
St. Petersburg	5/0 0	7/0 0
Deals, Finland		
2nd & 1st std 100	7/18 0	9/10 0
Do, 4th & 3rd ..	7/0/0	8/0 0
Do. Riga	6/10 0	8/0 0
St. Petersburg, 1st yellow ..	10/10 0	14/10/0
Do. 2nd yellow	8/0/0	9/10/0
Do. white	7/0 0	9/18/0
Swedish	7/10/6	16/0/0
White Sea	8/0/0	17/0/0
Canada, Pine 1st	20/0/0	26/10/0
Do. do. 2nd....	14/10/6	18/0/0
Do. do. 3rd, &c.	7/10/0	10/0/6
Do. Spruce. 1st	8/10/0	11/0 0
Do. do. 3rd & 2nd.....	6/10 0	8 0/0
New Brunswick	6/10,0	7/0/0
Battens, all kinds	3/10/0	15 10 0
Flooring Boards, sq., 1 in. prep. 1st	6/3/6	0/14 0
Do. 2nd.....	0/7/0	0/10/0
Other qualities	0/3 0	0 7/6
Cedar, Cuba ..ft.	/3½	/4½
Honduras, &c.	/3½	/4
Mahogany, Cuba.	/4½	/6½
St. Domingo, cargo av	/4	2/0
Mexican do. do	/4	/5
Tobasco do. do	/4½	/7
Honduras do..	/5	/6½
Box, Turkey ton	4/0/0	13/0/0
Rose, Rio.....	10/0/0	20/0/0
Bahia	9 0 0	18/0/0
Satin, St. Domingo ....ft.	0/0 7	0/1/3
Porto Rico	0/0/7	0/1/6

TIMBER (*continued*).		
Walnut, Italian..	0 0 3½	0/0/7
METALS.		
IRON—Pig, in Scotland .....ton	2/1/9	0/0/0
Bar, Welsh, in London.....	5/17/6	6/0/0
Do. do. at works in Wales	5/7/6	5/10/0
Do. Staffordshire, in London	6/5/6	6/15/0
COPPER—British, cake and ingot	51/10 0	52 0 0
Best selected ..	52/10/0	53/0/0
Sheets, strong..	60/0/0	0/0/0
Chili, bars	47/18/9	48/6/3
YELLOW METAL lb.	0/0/5	0 0 5⅜
LEAD — Pig, Spanish....ton	5/18 9	10/1/3
English, com. brands	16/5/0	10/7/6
Sheet, English, 8 lbs. per sq. ft. and upwards ..	11/10/6	0 0 0
Pipe	12/0/0	0/0/0
ZINC — English sheet .....ton	22/15 0	0/0/0
Vieille Montagne.....	23 5 0	0 0 0
TIN—Straits	93/10/0	94 0/0
Australian	94/0/0	94 10/0
English Ingots.	97/0 0	97/10 0
Banca	95/0 0	95/2/6
Billiton	94/5/0	94/7/6
OILS.		
Linseed .....ton	18/12 6	18/15.0
Cocoanut, Cochin	25/10/0	0/0/0
Do. Ceylon	24/0/0	0/0/0
Palm, Lagos	26/0/0	26/10/0
Rapeseed, English pale	25 0/6	25/10/6
Do. brown	23/5/0	23 10/0
Cottonseed ref...	18/0/0	0/0/0
Oleine	20/10/0	21/0/6
Lubricating, U.S.	4/0/6	5/0/0
Do. refined	5/10/0	12/0/0
TAR—Stockholm barrel	0/17 6	0/18/6
Archangel	0/12/6	0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 12 *noon on Thursdays.*]

ACTON (Middx.)—For alterations and additions to the Priory Board Schools, Acton, W. Mr. Edwd. Monson, jun., architect, Acton Vale, W.:—

Soole & Son	£4,600 0 0	Martin & Co.....	£3,947 0 0
Flew & Co.....	4,467 0 0	J. G. Chapman.....	3,944 19 10
F. R. Tozer	4,282 0 0	A. Martin	3,895 0 0
T. Bagge.....	4,260 0 0	G. Lifford	3,857 0 0
Whitehead & Co....	4,250 0 0	Akers & Co.	3,750 0 0
W. Tout	4,250 0 0	G. Hooper, Acton*..	3,740 0 0
J. Billins	4,214 9 0	Bray & Clayton	3,736 16 0
J. H. Jarvis	3,975 0 0	T. Nye.....	3,697 0 0
Lascelles & Co.	3,973 0 0	J. F. Collinson.....	3,560 0 0

* Accepted subject to the approval of the Education Department.

BARNARD CASTLE.—Accepted for the erection of a Wesleyan Church. Messrs. Morley & Woodhouse, architects, 269, Swan-arcade, Bradford, Yorkshire:—

Mason.—Kyle, Barnard Castle .....
Joiner.—G. P. Robinson, Darlington .....
Plumber and Painter.—C. Raine, Barnard Castle ..... } Total amount of tenders, £3,803.
Slater.—Mawcull, Darlington.....
Plasterer.—Welford, Barnard Castle.....

BIRMINGHAM.—Accepted for the erection of two houses in Livingstone-road, Handsworth. Mr. H. Hugh Allen, architect, Small Heath, Birmingham:—

Squires £590 0 0

BIRMINGHAM.—Accepted for the erection of two houses in Tennyson-road, Small Heath. Mr. H. Hugh Allen, architect, Small Heath, Birmingham:—

Edmunds..... £730 0 0

BRIDLINGTON.—For the erection of a house at Bridlington, for Mr. I. Willbourn. Mr. J. Shepherdson, architect, Bridlington Quay:—

W. Moody	£670	J. H. Hudson, Bridlington	
Postill.....	635	Quay (accepted)	£572

BRIDLINGTON QUAY.—For alteration to Royal Victoria Rooms. Mr. J. Shepherdson, architect, Prospect-street, Bridlington Quay:—

J. H. Hudson.....	£2,435 0	John Rennard, Bridlington Quay (accepted) ..	£2,093 10
Chas. Owston.....	2,400 0		

CATERHAM.—For additions and alterations at "Thornhill," Caterham, Surrey, for Mr Andrew Lockie. Mr. Chas. H. Wiltshire, architect, 13 and 15, Walworth-road, S.E.:—

Thompson	£1,150	Hoskins (accepted)	£1,093

CLAYBURY (Essex).—For the formation of roads, airing-courts, &c., at Claybury Asylum, near Woodford, Essex, for the London County Council. Mr. G. T. Hine, architect:—

J. Burrill.....	£16,786 3 7	T. Adams.....	£13,656 13 1
S. Kavanagh	15,359 13 4	B. Cooke & Co.	13,005 0 0
Reed, Blight, & Co., Limited	14,989 0 0	John Mowlem & Co.	11,549 0 0
J. Jackson	14,436 0 0	J. E. Bloomfield....	3,455 10 5!

[Referred to the Asylums Committee.]

DUDDINGTON (Northants).—For the erection of a schoolroom and offices at Duddington, near Northamptonshire. Mr. J. B. Corby, architect, Stamford, Lincs. Quantities by the architect:—

S. Hipwell.....	£98	A. S. Roberts	£747
J. Peasgood	84	E. Bowman	745
S. F. Halliday	79	W. & J. Perkins	737
W. Dean.....	75	Roberts Bros., Stamford* ..	635

* Accepted.

ERITH (Kent).—For the erection of a brick wall, iron fence, and enclosing cemetery (10 acres), for the Local Board. Mr. H. Hind, Surveyor, Local Board Offices, High-street, Erith:—

T. H. Walden.....	£2,300 0	C. Catlett.....	£1,795 10
G. Jackson & Co.	2,187 0	G. Miles, Avenue-road, Erith (accepted)	1,795 0
Bastin & Tawney	1,820 0		
G. H. Gunning	1,797 0	L. Faulkner & Sons....	1,425 0

FROME.—For the erection of buildings at the society's show yard, for the Somerset Agricultural Association. Mr. Cottam, surveyor, Bridgwater, Somerset:—

F. J. Seward	£1,028	James Withycombe, Bridgwater (accepted)	£455
W. Q. Cole	535		

ILKLEY.—Accepted for forming, &c., roads (287 yards), sewerage works (416 yards), and asphalting (1,380 yards super.), &c., for the Local Board. Mr. Marshall Hainsworth, jun., Surveyor, 14, The Grove, Ilkley:—

George Walker, Wortley-lane, Leeds £775 16 2

LEICESTER.—For the erection of Constitutional club-house and premises. Mr. Frank Seale, architect, 3½, Belvoir-street, Leicester. Quantities by the architect:—

E. B. Pipes	£5,955	T. C. Tyers	£5,550
J. Mason & Sons	5,888	J. O. Jewsbury	5,550
F. & H. Herbert	5,800	Clarke & Garratt	5,534
T. Richardson & Son	5,785	Hardington & Elliott	5,300
James Riddett.....	5,754	Wm. Glimson & Sons	5,254
J. H. Kellett	5,700	Thomas Murdy	5,247
Plant & Gurney	5,590		

LEYTON.—Accepted for the erection of a skittle-alley at the "Beaumont Arms" Beaumont-road, Leyton, for Mr. W. Nix. Mr. William G. Ingram, architect, 44, Theobalds-road, Bedford-row, W.C.:—

J. Knight..... £117 0 0

LONDON.—For new warehouse, White Lion-street, Pentonville, for Messrs. Culver & Son. Mr. F. Watson, architect:—

Killby & Gayford	£6,842	W. Shurmur	£6,084
Lawrence & Son	6 336	J. Bentley.....	5,866
Lidstone & Co.....	6,295		

LONDON.—For the construction of sewerage works, Vauxhall Bridge-road, for the Vestry of St. Margaret and St. John, Westminster. Mr. G. R. W. Wheeler, Surveyor, Town Hall, Westminster, S.W.:—

B. Cooke & Co.....	£8,400	Mayo & Co.	£5,740
Thos. Adams	8,351	E. Rogers & Co.	5,580
C. W. Killingback & Co...	5,800	J. H. Neave, Fulham*	4,994

* Accepted.

[Surveyor's estimate, £6,500.]

LONDON.—For the enlargement of the Portobello-road School, Notting-hill, by 80 places, for the School Board for London. Mr. T. J. Bailey, Architect:—

		If brickwork be built in cement, add
J. M. Pattinson.....	£2,906	£50
Foster & Dickson	2,795	42
Johnson & Co.....	2,730	24
F. J. Cosh'ed.....	2 629	75
Gregar & Son	2 599	60
Mowlem & Co.....	2 564	48
D. Charteris.....	2,445	60
Lawrance & Sons, Wharf-road, City-road, N.	2,408*	47*

* Recommended by the Works Committee for acceptance.

LONDON.—For the erection of a school to provide accommodation for 1,199 children on the site in Hugon-road, Wandsworth Bridge-road, and for the erection of a school-keeper's house, for the School Board for London. Mr. T. J. Bailey, Architect:—

		If brickwork be built in cement, add
J. & M. Patrick	£20,643 0 0	£309 0 0
B. E. Nightingale.....	19,778 0 0	570 0 0
Brass & Son.....	18,868 0 0	450 0 0
Foster & Dickson	18,725 0 0	319 0 0
H. Lovatt	18 443 0 0	547 0 0
Treasure & Son	18.218 0 0	473 0 0
Mowlem & Co.	18,102 0 0	548 0 0
E. Triggs	18,037 0 0	487 0 0
Kirk & Randall	17,434 0 0	467 0 0
J. T. Chappell	16,849 0 0	319 0 0
J. F. Collinson, Teddington	16,726 12 7*	318 12 9*

* Recommended by the Works Committee for acceptance.

LONDON.—For making up and paving Stephendale-road, Section 2, for the Fulham Vestry. Mr. W. Sykes, Surveyor, Town Hall, Walham Green, S.W.:—

	Road-way.	York.	Ada-mant.	Vic-toria.	Stuart's.	Im-perial.
E. Parry.....	447	330	—	—	—	—
Tomes & Wimpey	504	294	208	—	—	—
Nowell & Robson..	547	293	208	—	—	—
E. Rogers & Co. ..	523	—	283	—	—	—
Mowlem & Co.	575	305	276	290	276	261
H. J. Greenham ..	595	—	—	—	—	—
Imperial Stone Co.	—	—	—	—	—	225

LONDON.—For alterations and additions at "The Manor" tavern, Rectory-road, Stoke Newington, for Mr. J. Brewer. Mr. John E. Pinder, architect and surveyor, Bridge House, South Tottenham:—

Godfrey & Son.....	£153	S. Goodall*	£110
Sheffield Bros.....	115		

* Accepted.

LONDON.—For alterations and additions to "The Crown" beer-house, 208, Wandsworth-road, S.W., for the New London Brewery Company. Mr. William G. Ingram, architect, 44, Theobalds-road, Bedford-row, W.C.:—

Puttick Bros., Clapham £340 0 0

LONDON.—For the erection of new premises, 60, Powis-street, Woolwich. Mr. H. D. Church, architect:—

Chessum & Sons	£1,520	F. Tarrant	£1,425
Holloway	1,476	Multon & Wallis.....	1,339

LONDON.—For proposed alterations and additions to No. 17, Pall Mall East, W., for the Imperial Live Stock Association, Limited. Messrs. Essex, Nicol, & Goodman, architects, Birmingham. Quantities supplied:—

W. H. Clark	£2,824 0	Lacelles	£2,326 0
C. Wall	2,812 0	Brierley	2,314 0
W. Rosenberg & Co.....	2,705 15	Biggs...	2,300 0
Nightingale	2,538 0	Scrivener.....	2,139 0
Lilly & Lilly	2,349 0		

LONDON.—Accepted for new teak shop front, alterations, and fittings at 231, Tottenham-court-road, for Messrs. J. Hepworth & Son, Limited, Leeds:—

W. Rosenberg & Co., 64, Westminster Bridge-road £375 10 0

LONDON.—Accepted for new teak shop front, alterations, fittings and additions, 274, Old Kent-road, for Messrs. J. Hepworth & Son Limited, Leeds. Mr. Horace T. Bonner, architect, Queen-street Cheapside:—

W. Rosenberg & Co., 64, Westminster Bridge-road £283 0 0

MYNYDDISLWYN (Monmouth).—For the erection of additional class-rooms, near Abercarn, for the School Board. Mr. George Rosser, architect, 29, High-street, Newport, Mon. Quantities by architect:—

Ralph James	£1,583	Jenkins & Arnold	1,286
Andrew & Ramsay.....	1,373	John Jenkins	1,198
Chas. Morgan	1,370	Albert Richards.....	1,152
Morgan & Roberts	1,350	Davies Bros., Abercarn, Mon.*	1,170
D. C. Jones & Co.	1,349		

* Accepted.

NEWPORT (Mon.).—For street formation, sewers, paving, &c., for the Newport Workmen's Cottage Company, Limited :—

Hatherleigh	£535 0 0	Morgan & Roberts, Newport*	£335 0 0
R. Smith	391 8 0	T. Williams	338 1 6
J. Linton & Co.	385 0 0	* Accepted.	
T. Davies	372 0 0		

PORTSMOUTH.—For making additions to the "Bedford Hotel," Landport, for Messrs. Pike, Spicer, & Co. Messrs. Rake & Cogswell, architects, Portsmouth :—

H. Jones	£2,160	J. Crockerell	£1,799
W. R. & C. Light	2,045	J. H. Corke, Portsmouth*.	1,790
Scammell & Dowdell	1,900	* Accepted.	

SOUTHSEA.—For making structural alterations to the Royal Albert Yacht Club, Southsea, and other work connected therewith. Messrs. Rake & Cogswell, architects, Portsmouth :—

G. Croad	£594	W. Ward, Portsmouth*	£578
J. H. Corke	590	* Accepted.	

SOUTHSEA.—For building a private residence at Southsea, for Mr. F. A. Hobbs. Messrs. Rake & Cogswell, architects, Portsmouth :—

J. H. Corke	£988	H. Jones	£853
Chas. Harding	966	J. Crockerell, Portsmouth*.	750
T. Baskett	953	* Accepted,	

SOUTHSEA (Hants).—For the erection of school buildings, Highland-road, for the Portsmouth School Board. Messrs Rake & Cogswell, architects, Prudential-buildings, Landport. Quantities by Mr. Chas. H. Ball, Southsea :—

Armitage & Hodgson	£13,008	W. Evans	£10,947
W. Ward	12,200	Spriggins Bros.	10,900
W. R. & C. Light	11,799	Chas. Harding	10,890
Scammell & Dowdell	11,700	J. H. Corke	10,850
A. E. Porter	11,150	T. Quick	10,797
T. P. Hall	11,133	H. Jones	10,783
Morgan, Isted, & Morgan	10,983	W. Learmouth	10,410

THAMES DITTON.—Accepted for building new billiard saloon, skittle alley, and coach-house, for Mr. C. Tod-Pullen. Messrs. Dickinson & Patterson, architects, 5, John-street, Adelphi, W.C. :—
W. Callingham, Thames Ditton £745 0 0

TOTTENHAM.—For the erection of a hall and class-rooms, High-road, South Tottenham, for Mr. J. E. Flood. Mr. John E. Pinder, architect and surveyor, Bridge House, South Tottenham :—

J. Groves	£649	P. Bart	£478
F. Voller	577	Knight & Son*	476
H. Say	520	* Accepted.	

WALLINGTON (Surrey).—For making up new road at Wallington, for Captain Taylor, J.P. Messrs. Baker & Sons, surveyors, 11, Queen Victoria-street, E.C. :—

Streeter Bros	£415 0	Thos. Rigby	£158 0
M. S. Kitteringham	2 3 0	Wm. Lang idge	157 10
Bacon & Humphreys	210 0	W. H. Wheeler, 134, Sumner-street, Southwark*	123 0
James Bowles	190 0	* Accepted.	
J. Cattell	188 0		
Cephas Budd	187 0		

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6. Exeter	June 6.	12. Gloucester	Dec. 5.

1892.

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17. Llandaff	May 7.	23. Winchester	Oct. 1.
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1893.

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28. Chester	Mar. 4.	31. Durham	June 3.

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J. P.—H. and P.—H. W.—C. F. M. (we can see no possible reason for a letter on the subject at this moment).—J. R.—D. E. L. (too small).—R. H. H. (does not comply with our conditions).—W. G. S. (ditto).—H. M.—H. L. (too late).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

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Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 42, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tun-rooms, and terraces. Asphalte Contractors to the Forth Bridge Co. [ADVT.

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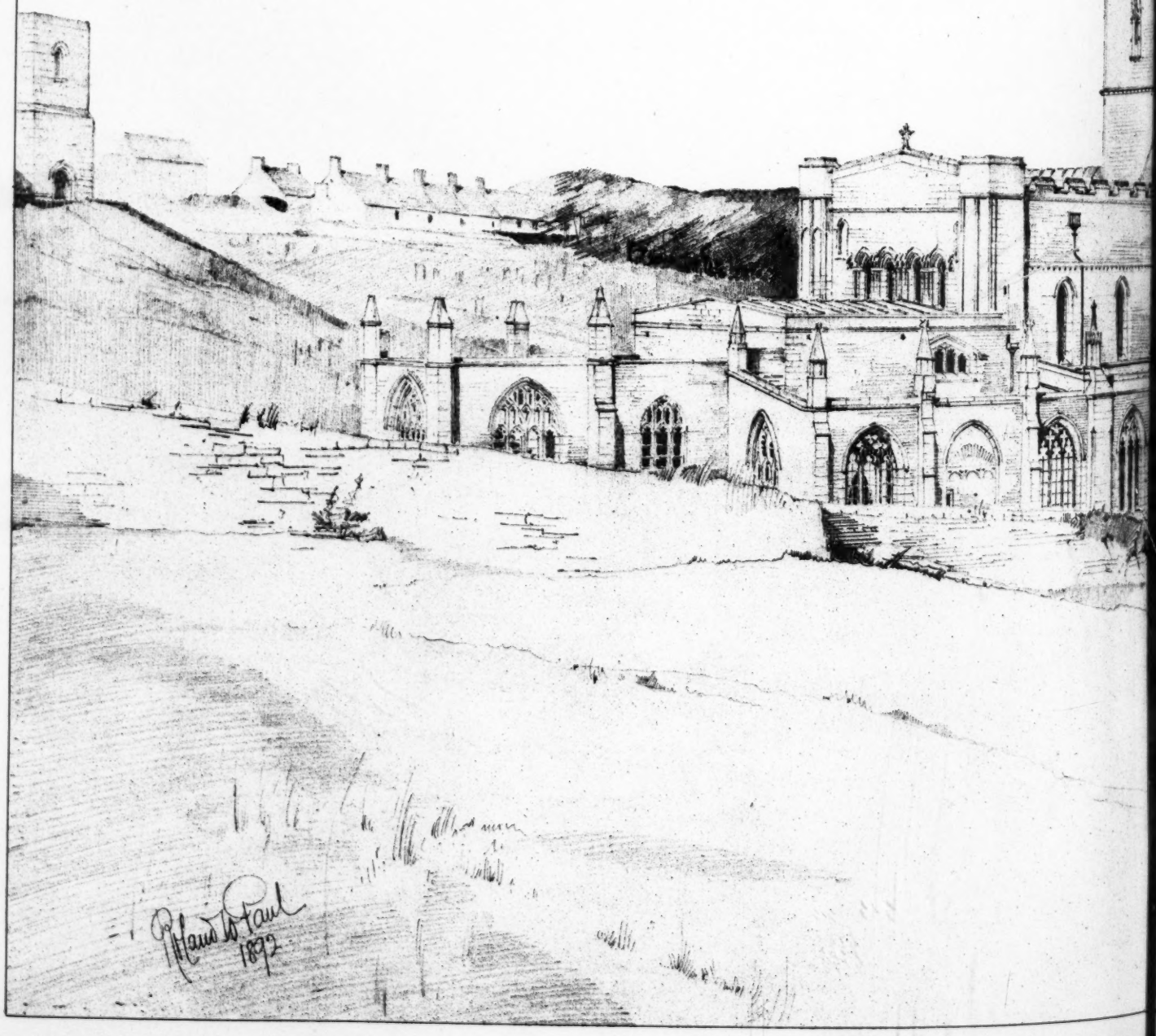


Cathedrals of E nd

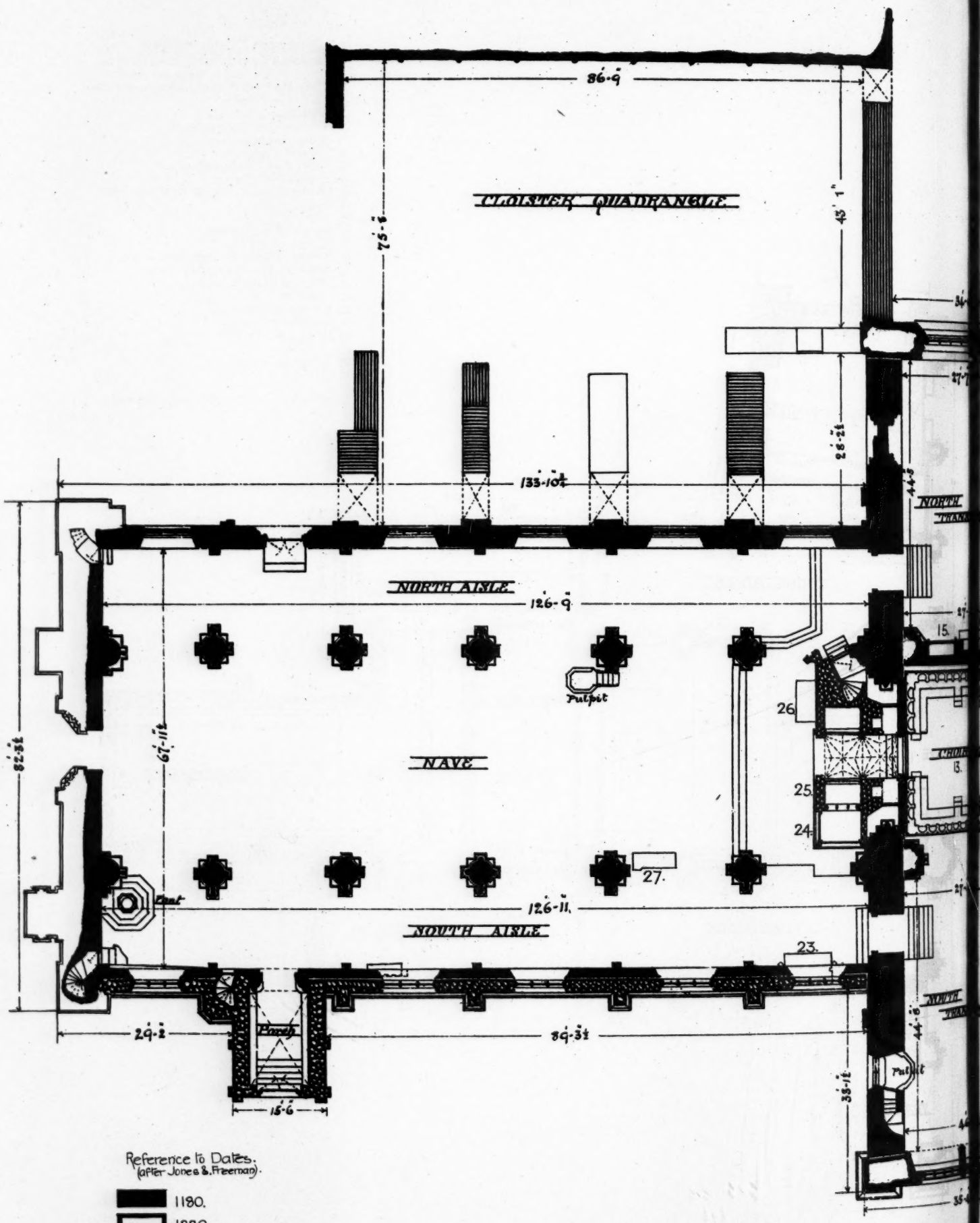
No. 25. ST. DAVID'S: FROM THE NO AST.

INK-PHOTO SPRAGUE & Co 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

nd and Wales.

E NO AST.—Drawn by Mr. Roland W. Paul.

St. DAVIDS CATHEDRAL



Reference to Dates.
(after Jones & Freeman).

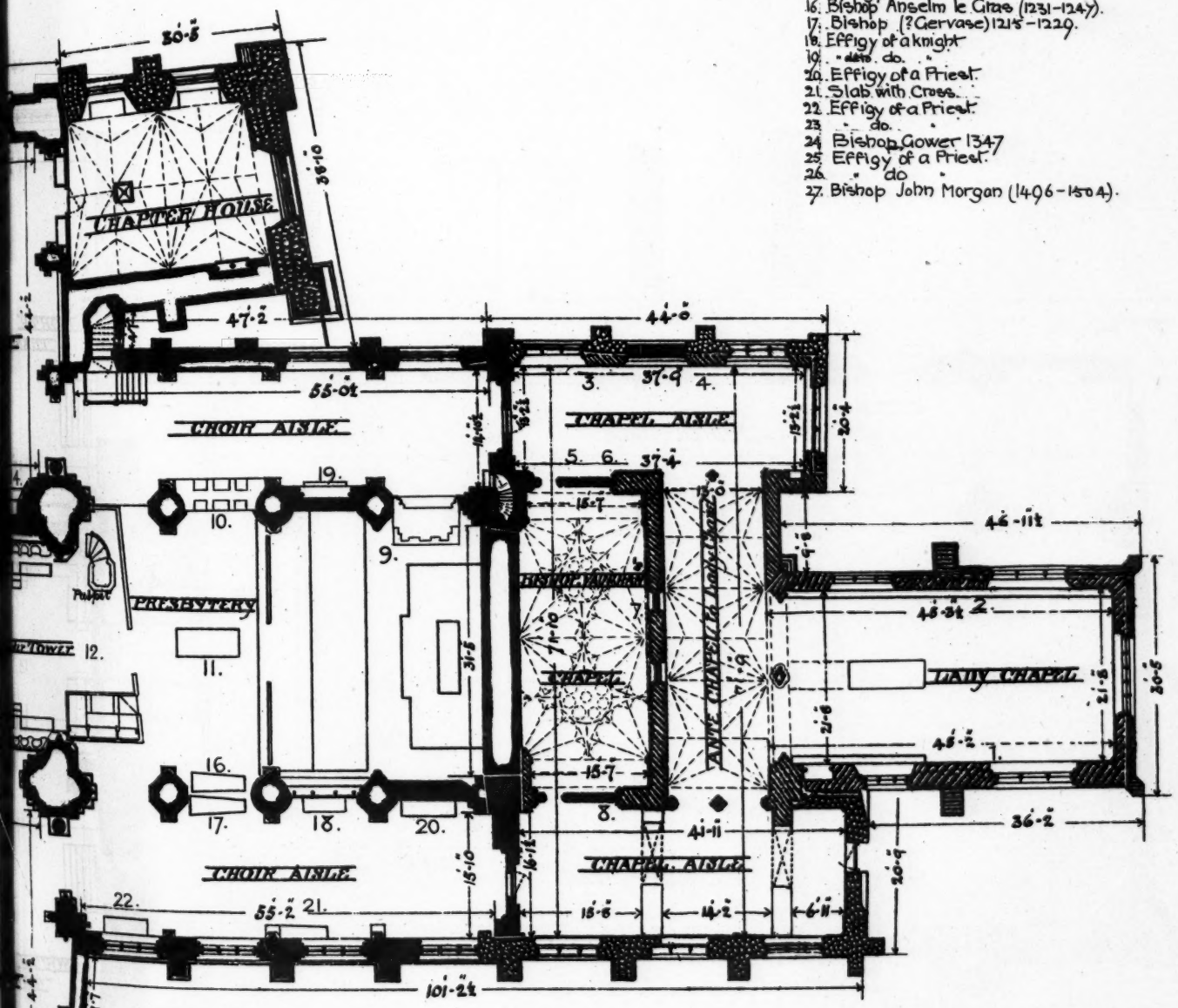
- 1180.
- 1220.
- 1248.
- 1290.
- 1328-47.
- 1384.
- 1461-1522.
- Modern & rebuilding.

Ground

AL: S. WALES:

Reference to Monuments, etc.

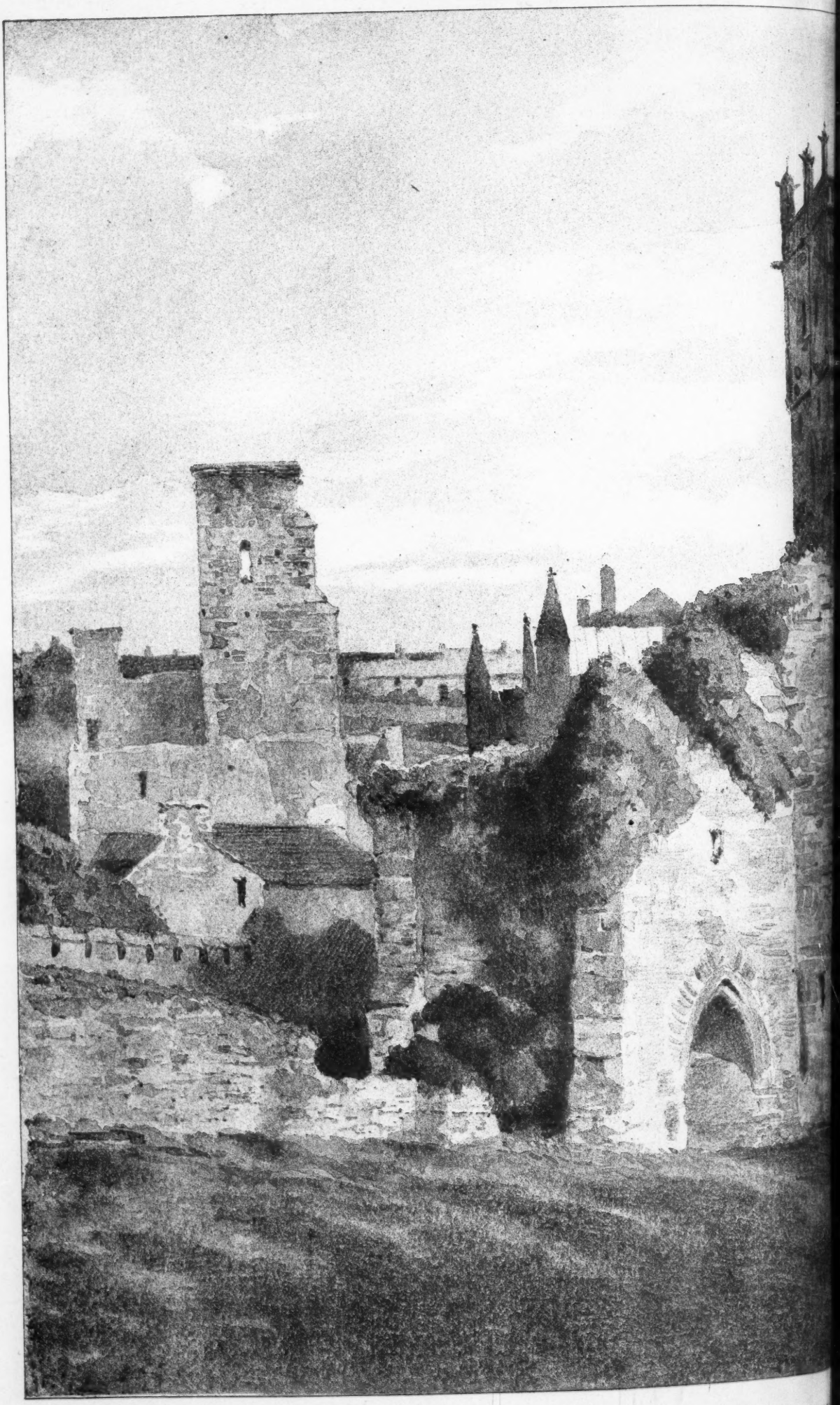
1. Canopied Tomb (? Bishop David Martyn).
2. " " (? Bp. Beck 1280-93).
3. Effigy of a Knight (Sir John Wogan of Picton)
4. " " Priest.
5. Archdeacon Hiot d. 1419.
6. Fragments of Sculpture.
7. Archbishop Vaughan.
8. Effigy of a knight.
9. Thos Lloyd, Treasurer 1612.
10. S. David's Shrine.
11. Edmund Tudor, Earl of Richmond 1456.
12. Slab.
13. " do. "
14. Shrine of S. Caradoc.
15. Effigy of a Priest.
16. Bishop Anselm le Gras (1231-1247).
17. Bishop (? Gervase) 1215-1229.
18. Effigy of a knight.
19. " do. "
20. Effigy of a Priest.
21. Slab with Cross.
22. Effigy of a Priest.
23. " do. "
24. Bishop Gower 1347
25. Effigy of a Priest.
26. " do "
27. Bishop John Morgan (1496-1504).



ing Plan

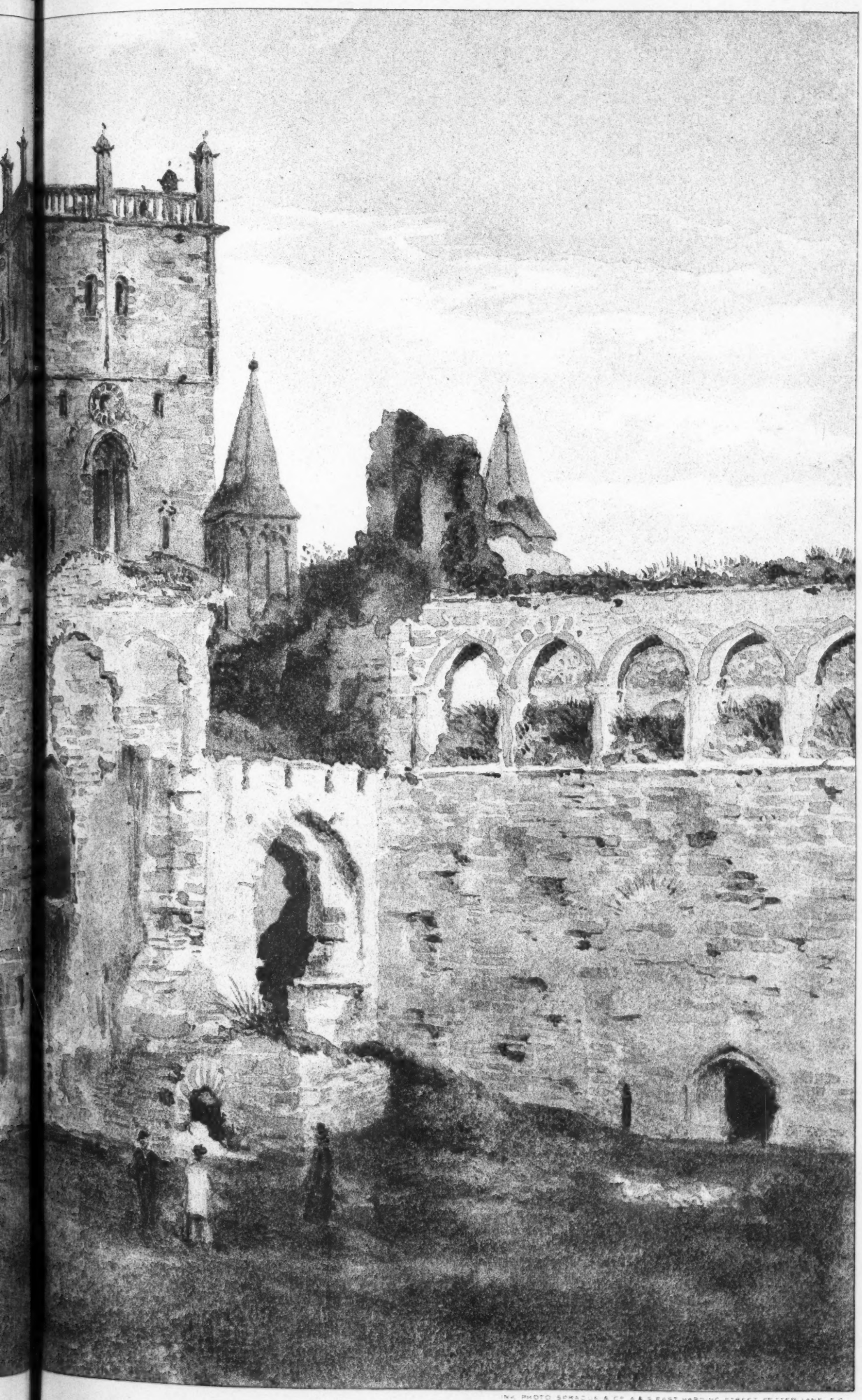
Scale of feet

From Plan lent by
Mr. T. Taylor Scott.



ST. DAVID'S: THE CATHEDRAL FROM

FROM A WATER-COLOUR



INV. PHOTO. SPRAGUE & Co. 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

[illegible]OURTYARD OF THE BISHOP'S PALACE

BY Mr. T. G. JACKSON, A.R.A.

INK-PHOTO SPRAGUE & Co 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

EAST WINDOW, SKELTON-IN-CLEVELAND CHURCH, YORKSHIRE.—By Messrs. Shrigley & Hunt

Royal Academy Exhibition, 1892.